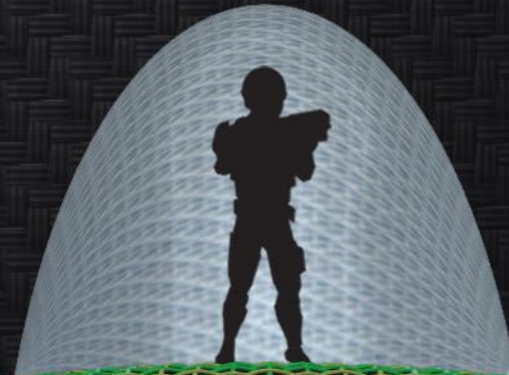


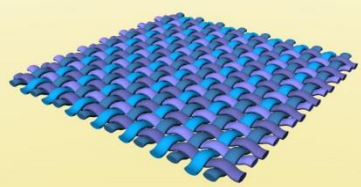
# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

PROPOSERS' DAY

20 May 2015



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# Welcome and Introduction



***Ms. Adele Ratcliff***

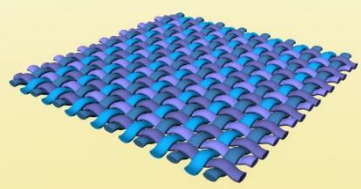
Director, DoD ManTech  
ODASD(MIBP)

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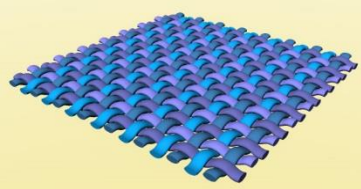
## Morning Agenda

- 0800 – 0900: Registration and networking**
- 0900 – 0905: Carter Center Welcome**
- 0905 – 0915: OSD Welcome**
- 0915 - 0925: DoD Perspectives – DoD-Led Institutes**
- 0925 – 1000: Institutes for Manufacturing Innovation-Objectives**
- 1000 – 1015: Break**
- 1015 – 1100: FOA Technical Overview**
- 1100 – 1145: FOA Contracting Overview**
- 1145 – 1230: Initial Q&A**

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## Afternoon Agenda

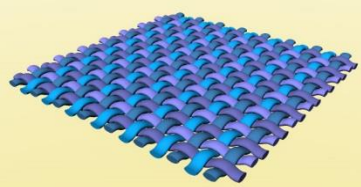
- 1230 – 1345: No Host Lunch (Teaming discussions among potential Proposers encouraged)
- 1345 – 1400: Flexible Hybrid Electronics Manufacturing Innovation Institute Overview
- 1400 – 1415: Institute for Advanced Composites Manufacturing Innovation
- 1415 – 1430 National Science Foundation
- 1430 – 1445 Break
- 1445 – 1550: Additional Q&A
- 1550 – 1600: Concluding Remarks

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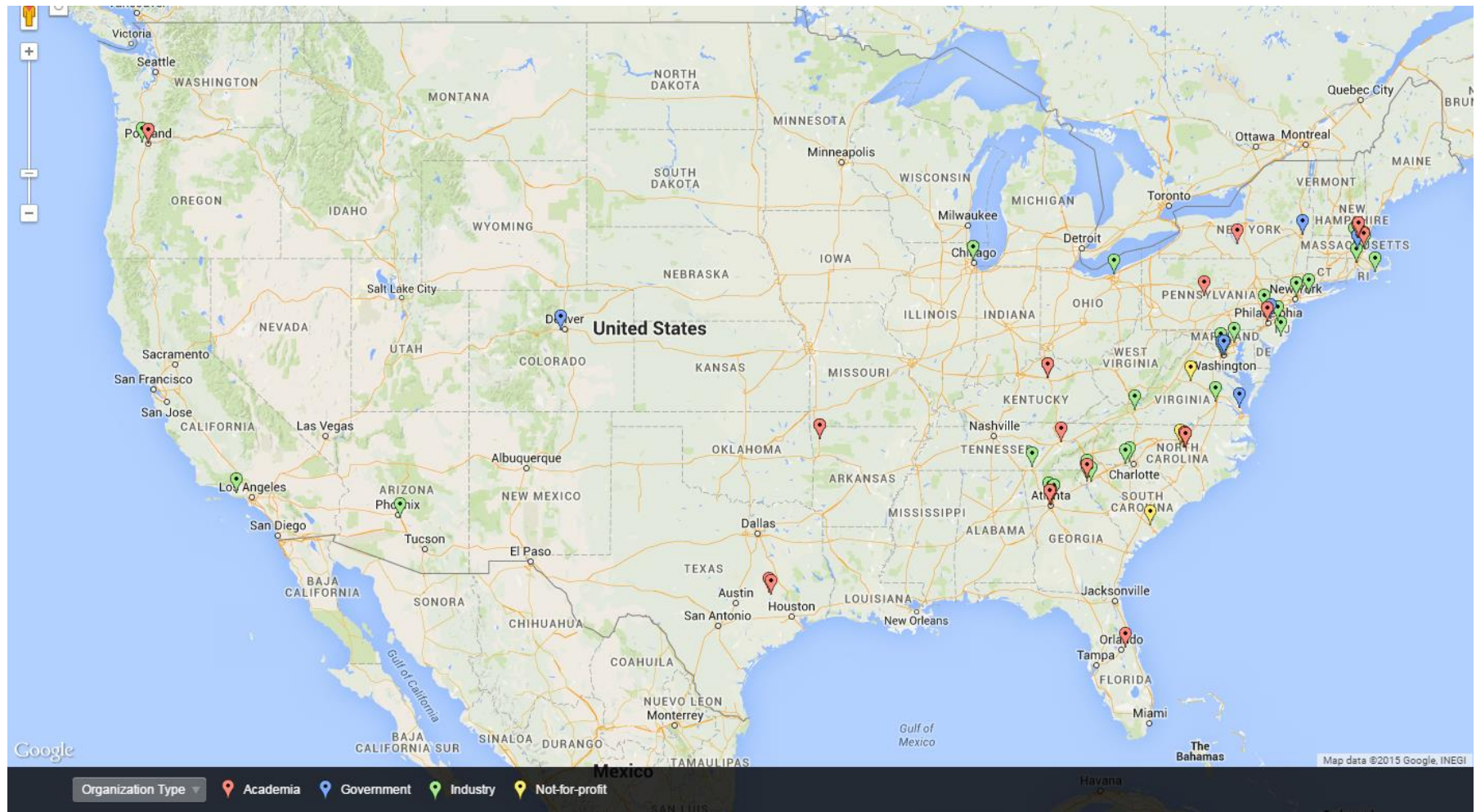
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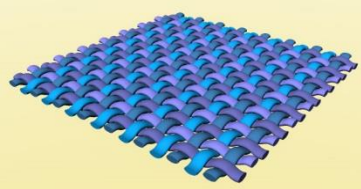
# Distribution of Attendees



## REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE PROPOSERS' DAY

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## LinkedIn Collaborative Site

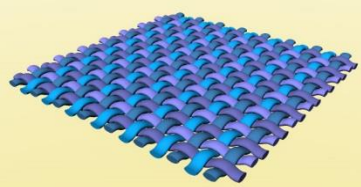
- <https://www.linkedin.com/grp/home?gid=8285697>
- Provided for collaboration
- Will post contacts from “Want to Lead” and “Want to Team” boards

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# DoD Perspectives – DoD-Led Institutes



*Mr. André Gudger*

Acting DASD (MIBP)

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# *Institutes for Manufacturing Innovation:*

## *The Substance of the National Network for Manufacturing Innovation (NNMI)*

Robert S. "Scott" Frost  
Manufacturing Technology Office  
Office of the Deputy Assistant  
Secretary of Defense for  
Manufacturing and Industrial  
Base Policy (ODASD/MIBP)  
U.S. Department of Defense







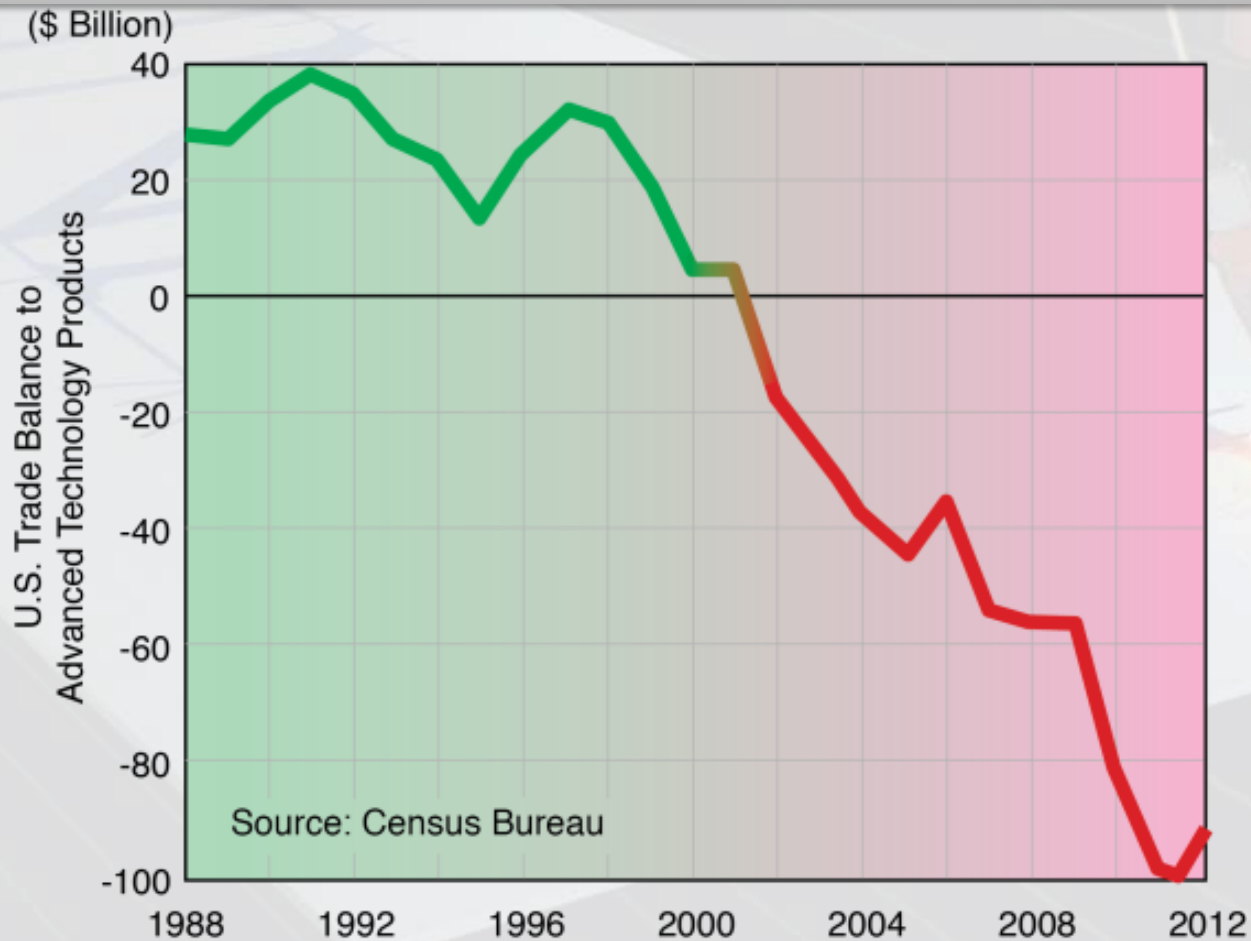
# **Impetus for the NNMI Initiative**

# U.S. Trade Balance of Advanced Technology

## *Swung to historic deficit, lost 1/3<sup>rd</sup> of workforce*

- **11%** of U.S. GDP, **12 million** U.S. jobs
- **Nearly 20%** of the world's manufactured value added
- ~ half of U.S. Exports

U.S. Trade Balance for Advanced Technology  
Manufacturing Products (\$ Billions)





# Products invented here, now made elsewhere

## – labor cost often not the predominant factor



# The Administration's Early Focus on the U.S. Manufacturing Sector...

*"I want us all to think about new and creative ways to engage young people in science and engineering ...*

*encourage young people to create, build, and invent*

*to be makers of things, not just consumers of things"*



**President Obama - 2009 National Academy of Sciences Annual Meeting**

# ...is now a Growing National Advanced Manufacturing Initiative

**June 2011**

**REPORT TO THE PRESIDENT  
ON ENSURING AMERICAN  
LEADERSHIP IN ADVANCED  
MANUFACTURING**

Executive Office of the President  
President's Council of Advisors  
on Science and Technology

JUNE 2011



**February 2012**

**A NATIONAL STRATEGIC  
PLAN FOR ADVANCED  
MANUFACTURING**

Executive Office of the President  
National Science and Technology Council

FEBRUARY 2012



**July 2012**

**REPORT TO THE PRESIDENT ON  
CAPTURING DOMESTIC  
COMPETITIVE ADVANTAGE IN  
ADVANCED MANUFACTURING**

Executive Office of the President  
President's Council of Advisors on  
Science and Technology

JULY 2012



**January 2013**

**NATIONAL NETWORK  
FOR MANUFACTURING  
INNOVATION:  
A PRELIMINARY DESIGN**

Executive Office of the President  
National Science and Technology Council  
Advanced Manufacturing National Program Office

JANUARY 2013



**October 2014**

**REPORT TO THE PRESIDENT  
ACCELERATING U.S. ADVANCED  
MANUFACTURING**

Executive Office of the President  
President's Council of Advisors on  
Science and Technology

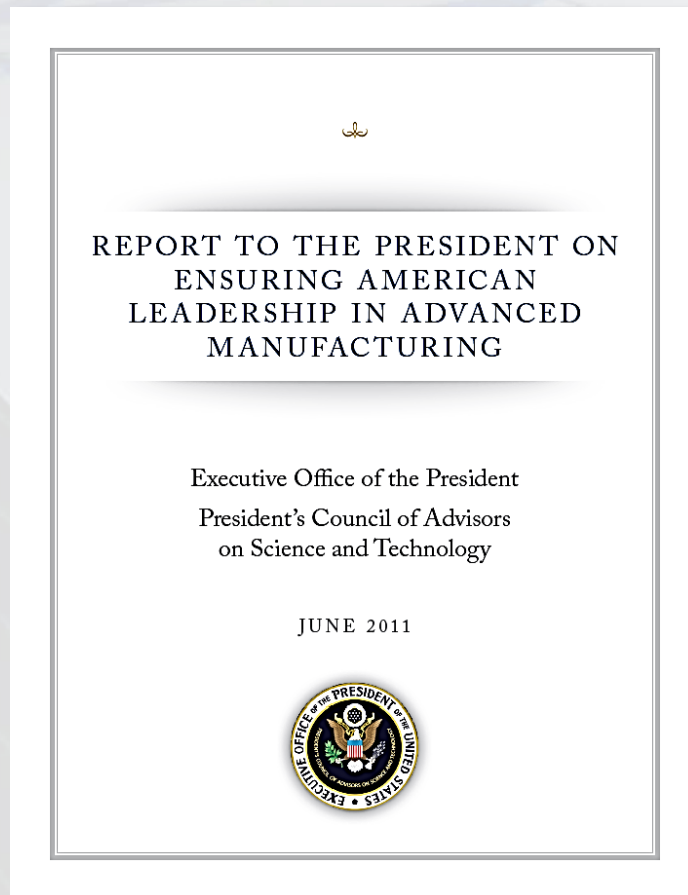
October 2014



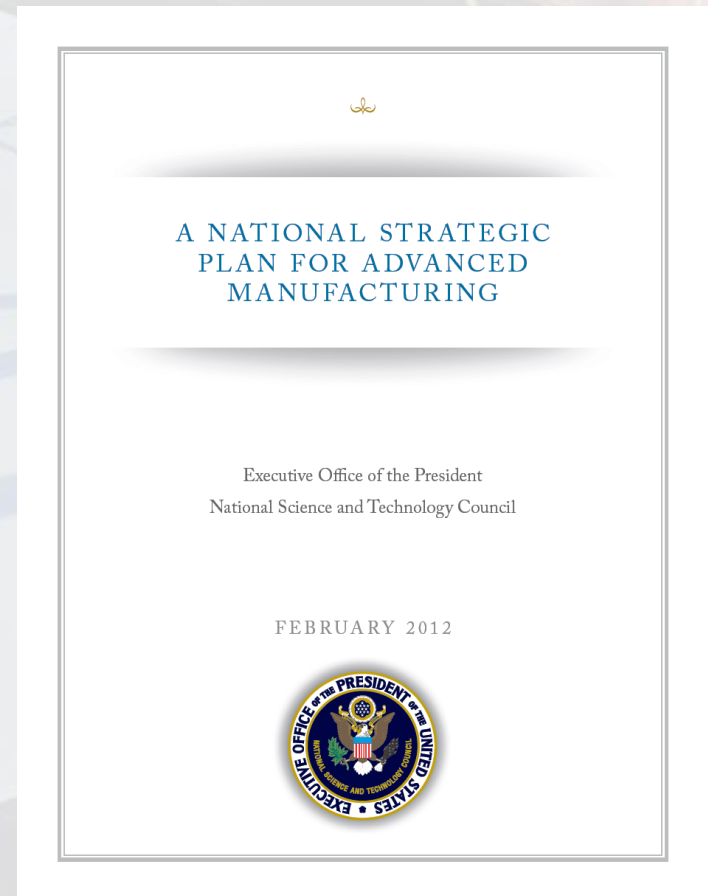


# Two Foundational Documents

## 2011 PCAST Report



## 2012 National Strategic Plan for Advanced Manufacturing



# President's Council of Advisors on Science and Technology Advanced Manufacturing Partnership



Andrew Liveris  
CEO, Dow Chemical

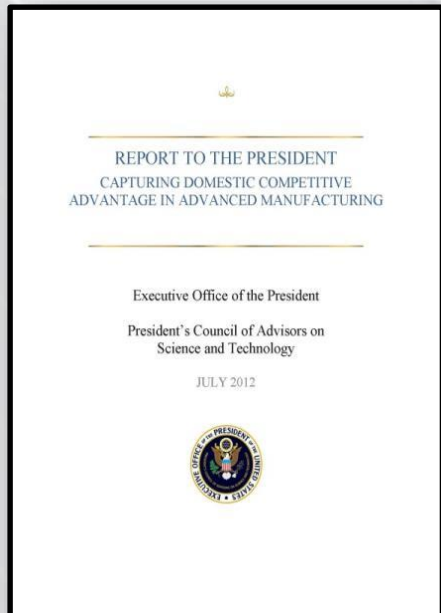
## AMP Co-chairs

Susan Hockfield  
President, MIT



**PCAST / AMP report released July 2012 on [whitehouse.gov](http://whitehouse.gov)**

- 16 Recommendations in three areas: innovation, talent, and policy



Two of these recommendations:

- 1) Coordinated “whole of government” effort via Advanced Manufacturing National Program Office
- 2) Pursue the “missing middle” via manufacturing innovation hubs → NNMI

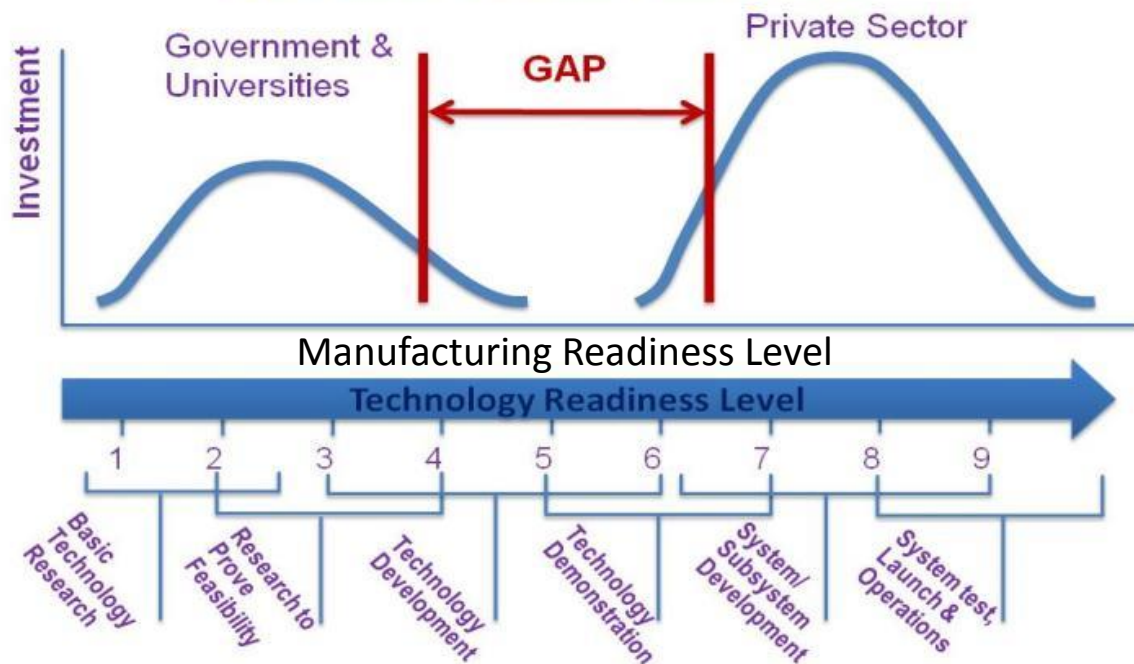
# The Scale-up Gap or Missing Middle



*Common terms*  
*The “valley of death”*  
*The “missing Bell Labs”*  
*The “industrial commons”*



## Gap in Manufacturing Innovation





# 2012 Presidential Actions to Establish a Network of Institutes



*"Sparking this network of innovation across the country, it will...keep America leading in manufacturing..."*

*President Obama, March 9, 2012*

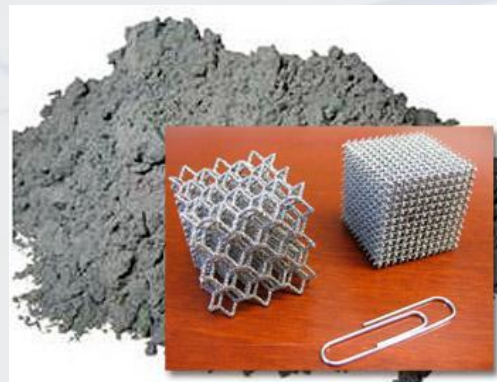
- President asks Congress to authorize initial network of up to 15 Manufacturing Innovation Institutes
- President directs Agencies to work together on Pilot Institute, while designing Institutes with input from Industry and Academia

# The First Pilot Manufacturing Innovation Institute

## *Additive Manufacturing/3D Printing – Youngstown OH*

### Prime Awardee: National Center for Defense Manufacturing and Machining

- Established August 2012
- Initial \$30M federal investment matched by \$40M industry, state/local
- Strong leveraging of equipment, existing resources
- Strong business development
- Tiered membership-based model, low cost to small business and nonprofits

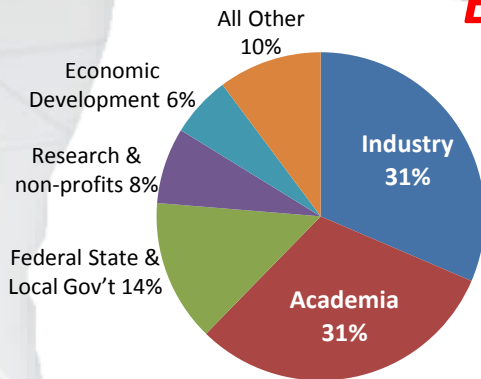


- **Now at \$50M federal, with co-investment**
- **Over 100 participating members**



# Public Engagement on NNMI Design *Workshops & Request for Information*

***Broad & Diverse Stakeholder Input  
1,200 voices on the NNMI Design***



**National Academies Beckman Center**  
Irvine California



**University of Colorado**  
Boulder, Colorado



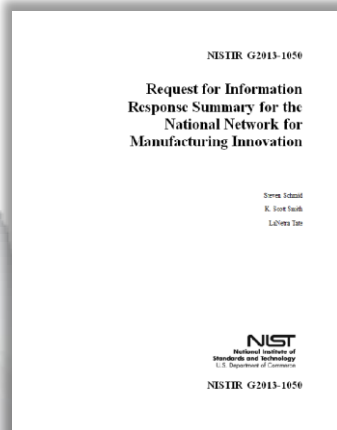
**Cuyahoga Community College**  
Cleveland Ohio



**Rensselaer Polytechnic Institute**  
Troy New York



**U.S. Space and Rocket Center**  
Huntsville, Alabama

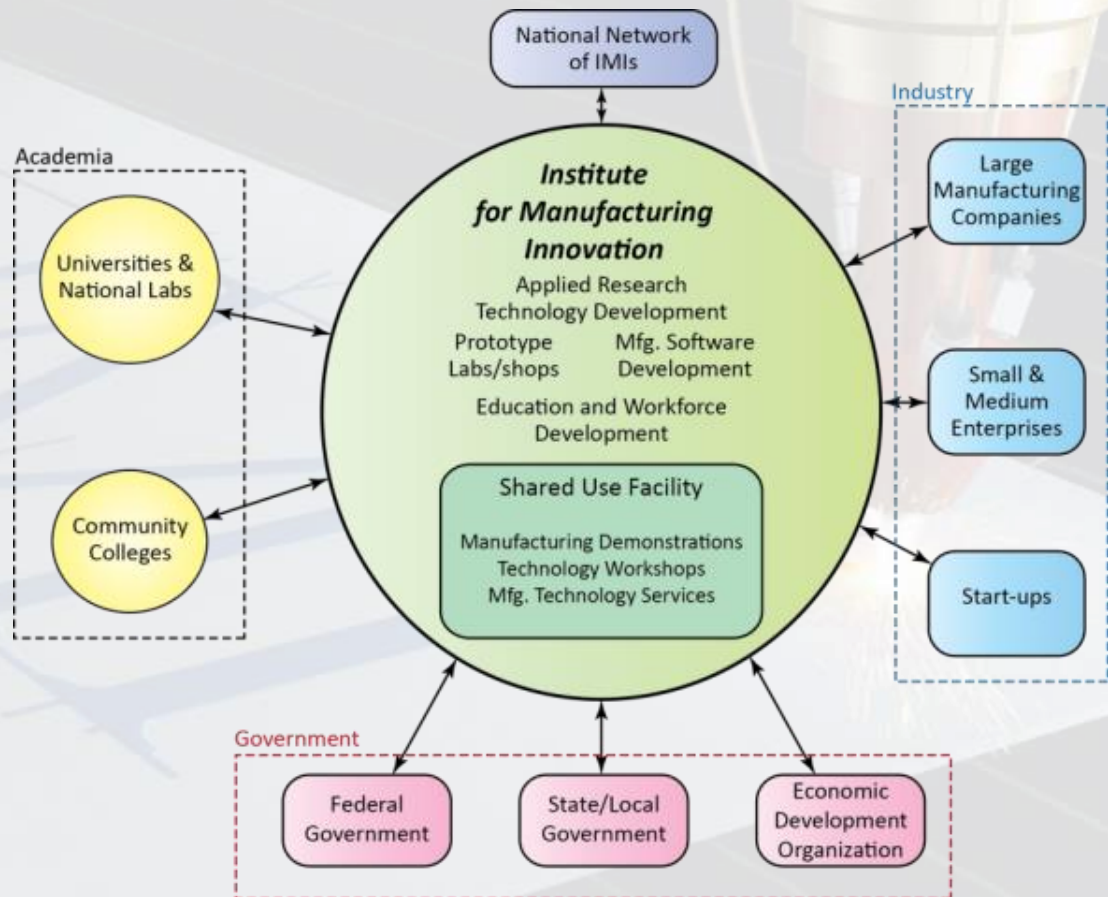
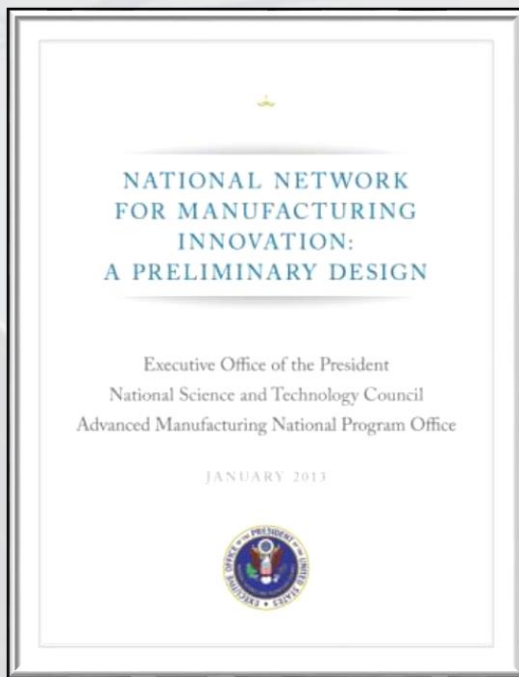




# The Institute Design

Creating the space for Industry & Academia to collaborate

White House Report  
NNMI Framework Design  
January 2013



## Partnership: *Industry – Academia – Government*

Working better, together to create transformational technologies and build new products and industries

# Institute Major Activities



## Applied Research & Demo projects for

- reducing cost/risk on commercializing new tech.
- Solving pre-competitive industrial problems



**Tech Integration** - Development of innovative methodologies and practices for supply chain integration



## Small/Medium Enterprises

- Engagement with small and medium-sized manufacturing enterprises (SMEs).



## Education, technical skills and Workforce development

Education and training at all levels for workforce development

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# **NNMI Institutes: Status**



# DoD and DOE

## Established Institutes

- *America Makes* (The National Additive Manufacturing Innovation Institute)—DoD-Led; Established **August 2012**
- *Power America* (Next Generation Power Electronics Manufacturing Innovation Institute)—DOE-Led; Announced **January 2014**
- *Digital Manufacturing & Design Innovation Institute* (DMDII)—DoD-Led; Established **February 2014**
- *LIFT -- Lightweight Innovations for Tomorrow* (Lightweight & Modern Metals Manufacturing Institute)—DoD-Led; Established **February 2014**
- *Institute for Advanced Composites Manufacturing Innovation* (IACMI)—DOE-Led; Announced **January 2015**

# America Makes – The National Additive Manufacturing Innovation Institute

**Est. August 2012; Hub location: Youngstown, OH**

**Lead: National Center for Defense Manufacturing and Machining (NCDMM)**

**Regional location: “TechBelt” Cleveland to Pittsburgh Corridor**

- 53 companies, 36 universities & labs, 26 other organizations
- \$50M federal investment and 1:1 cost share pledged to support development and management of the institute plus applied research projects over 5 years
- 22 research projects underway with \$13.5M federal funds plus \$15M private funds so far
- Industry entrusted 14 machines to the institute
- Strong tech transition, workforce education & STEM focus



# Digital Manufacturing and Design Innovation Institute (DMDII)

Est.: February 2014

Lead: UI LABS

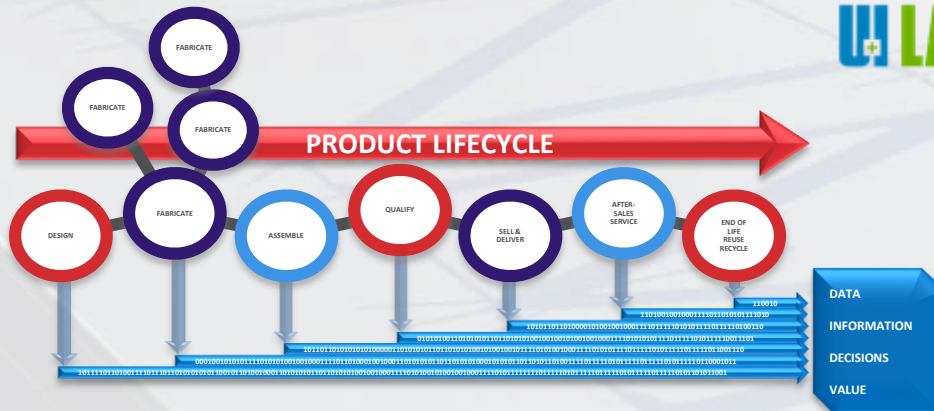
Hub location: Chicago, IL



## DMDII

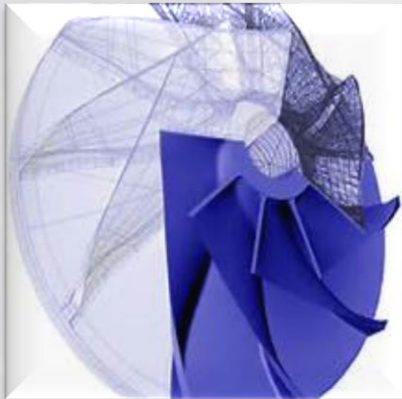
DIGITAL MANUFACTURING AND  
DESIGN INNOVATION INSTITUTE

### UI LABS



President Barack Obama announces the DMDI Institute, 25 February 2014.  
(Official White House Photo by Pete Souza)

**Federal Funding: \$70M**  
**Cost Share (UILabs): \$248M**



**Mission:** Establish an inclusive state-of-the-art proving ground for digital manufacturing and design that links IT tools, standards, models, sensors, controls, practices and skills, and transition these tools to the U.S. design & manufacturing industrial base for full-scale application

**Over 3:1 Industry Cost Share**



# **LIFT: *Lightweight Innovations for Tomorrow*** **(Lightweight and Modern Metals Mf'g)**

**Est. February 2014**

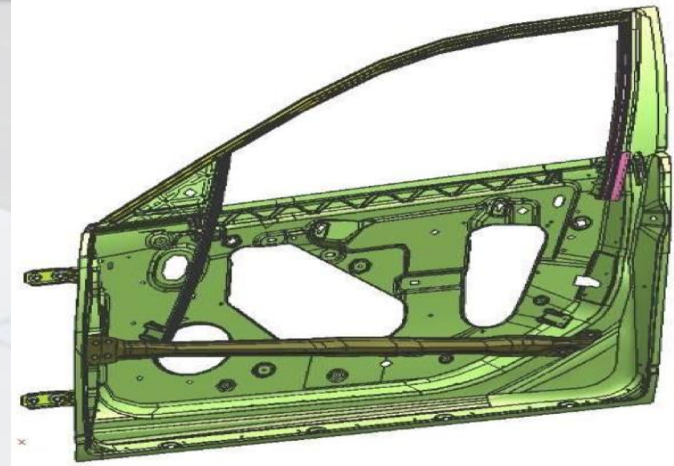
**Lead: ALMMII (American Lightweight Materials  
Manuf. Innovation Institute)**

**Hub location: Detroit Metro, Michigan**

**Regional location: I-75 Corridor**

**Current number of members: 78**

**Federal Funding: \$70M**



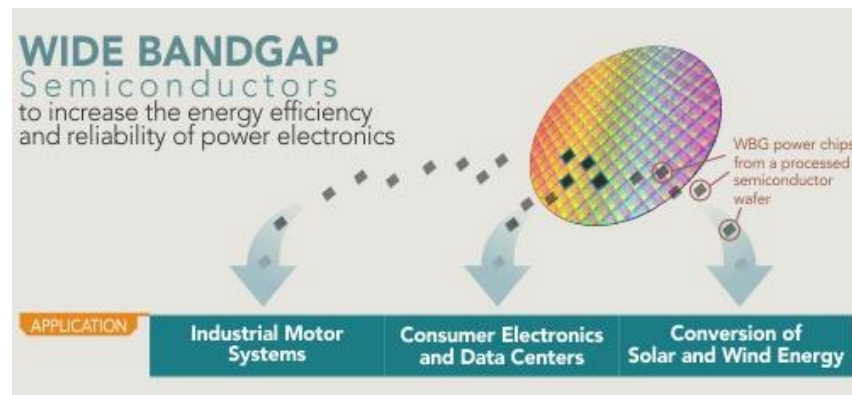
**Mission: Provide the National focus on expanding US competitiveness and innovation, and facilitating the transition of these capabilities and new technologies to the industrial base for full-scale application.**

**Positioned to expand the US Industrial base for new products and technologies for commercial and USG demands that utilize new, lightweight high-performing metals**

# Power America

## Lead: North Carolina State University

ABB, Arkansas Power Electronics International, Cree, Deere & Company, Delphi Automotive, Mechatronics, Monolith Semiconductor, Toshiba International, Transphorm, United Silicon Carbide, Vacon, Arizona State University, Florida State University, University of California-Santa Barbara, Virginia Tech, National Renewable Energy Lab, Naval Research Lab



**President Obama**

**North Carolina State University, January 15, 2014**

**Mission:** Develop advanced manufacturing processes that will enable large-scale production of wide bandgap semiconductors, which allow power electronics components to be smaller, faster and more efficient than silicon.

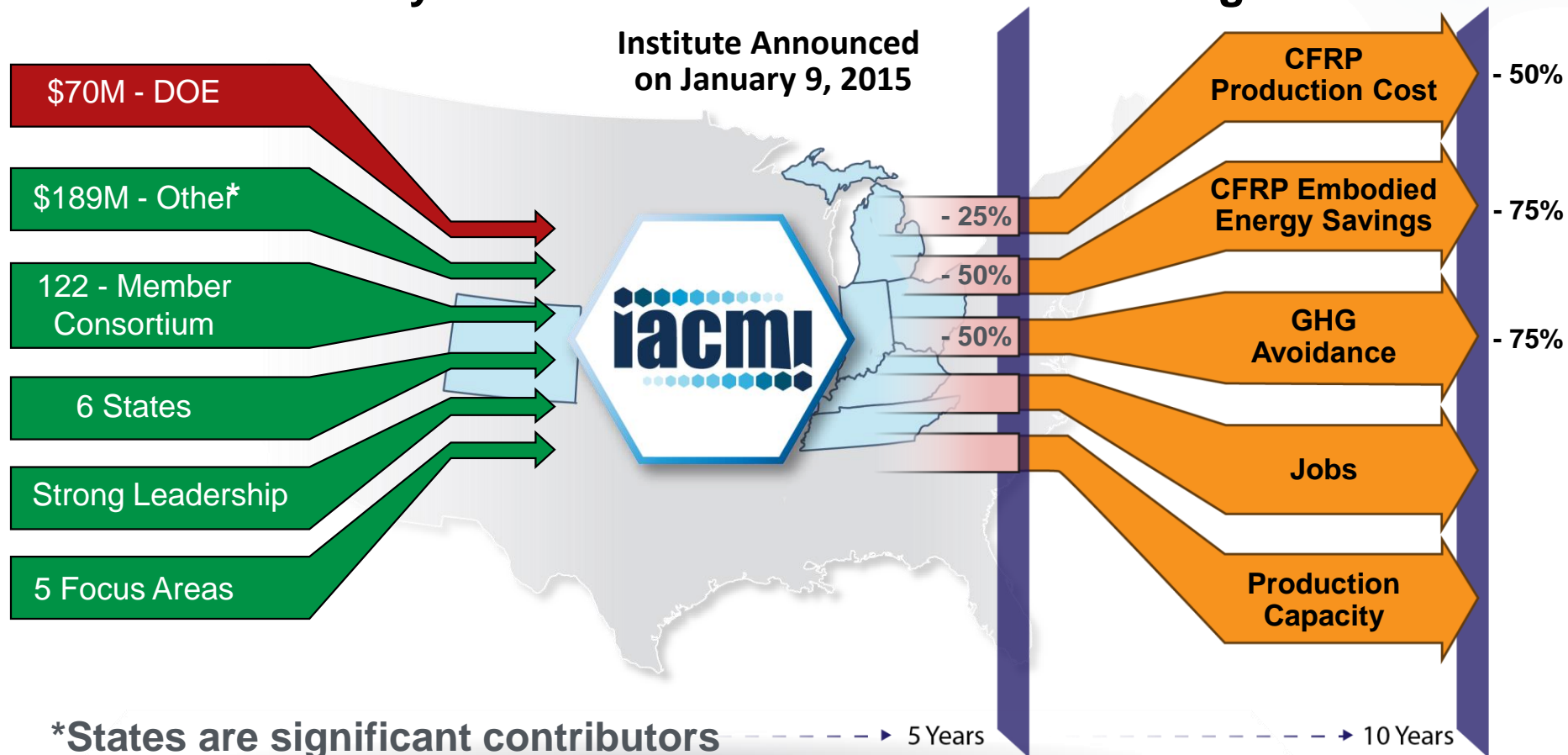
***Poised to revolutionize the energy efficiency of power control and conversion***

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# Institute for Advanced Composites Manufacturing Innovation (IACMI)

**Federal investment will catalyze a composites ecosystem in the heart of US manufacturing**

Institute Announced  
on January 9, 2015



Institute for Advanced Composites Manufacturing Innovation

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# Fiscal Year 2015

## Institutes in Acquisition

### ■ DoD-Led Institutes

- Integrated Photonics Institute for Manufacturing Innovation
  - FOA released November 2014
  - Institute award anticipated June 2015
- Flexible Hybrid Electronics Manufacturing Innovation Institute
  - FOA released February 2015
  - Institute award anticipated September 2015

### ■ DOE-Led Institutes

- Smart Manufacturing Institute for Energy Efficiency
  - FOA to be released soon
  - Institute award date TBD

# DoD Institute #4

## *Integrated Photonics Institute for Manufacturing Innovation*

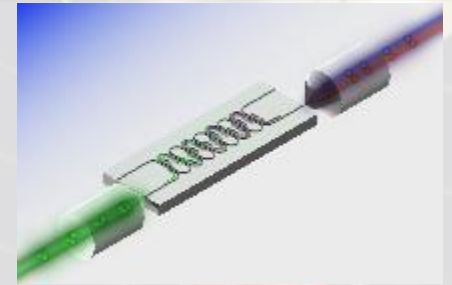
*More than \$100M federal investment over five years*

### Objective

Develop and demonstrate innovative manufacturing technologies for:

- Ultra high-speed transmission of signals for the internet and telecommunications
- New high-performance information-processing systems and computing
- Sensors and imaging enabling dramatic medical advances in diagnostics, treatment, and gene sequencing

This Institute will focus on developing an end-to-end photonics 'ecosystem' in the U.S., including domestic foundry access, integrated design tools, automated packaging, assembly and test, and workforce development.

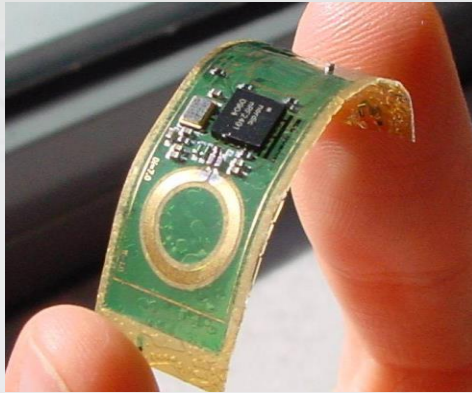


***All these developments will require cross-cutting disciplines of design, manufacturing, packaging, reliability and testing.***

# DoD Institute #5

## *Flexible Hybrid Electronics Manufacturing Innovation Institute*

**\$75M federal investment over five years**

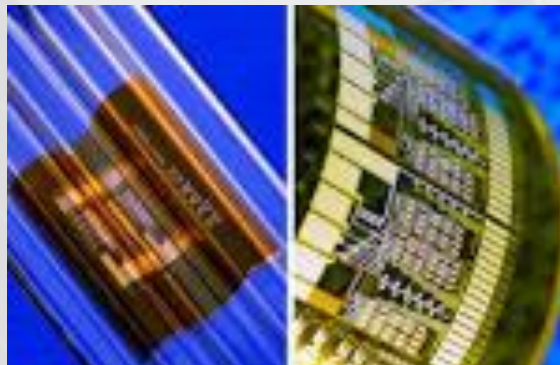
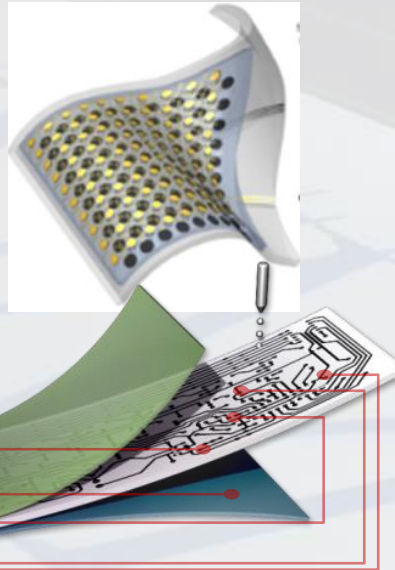


Comm

Power

Logic

Sense A, B...



**Flexible Hybrid Electronics:** Highly tailorable devices on flexible, stretchable substrates that combine thinned CMOS components with components that are added via “printing” processes. This technology is identified as flexible-hybrid due to integration of flexible components such as circuits, communications, sensors, and power with more sophisticated Silicon based processors.

Commercial	DOD Applications
<u>Wearable Technologies</u>	Warfighter information devices and sensors
<u>Internet of Things</u>	Unattended sensors, vehicle borne sensors
<u>Medical</u> prosthetics, medical sensing	Warfighter Training and performance monitoring. Soldier medical care

**POTUS Announcement– December 12, 2014**



# DoD Institute #6

## *Revolutionary Fibers and Textiles Manufacturing Innovation Institute*

**\$75M federal investment over five years**

### Revolutionary Fibers and Textiles

*Advances in fiber science have created fibers with extraordinary properties of strength, flame resistance, and electrical conductivity. These 'revolutionary' fibers are composed of specialty fabrics, industrial fabrics, e-textiles, and advanced textiles. They are built upon a foundation of synthetic and/or multi-material fibers that have a wide-range of applications in both the defense and commercial sector that go beyond traditional wearable fabrics*

### Objective:

- Serve as a public-private partnership between government, academia and industry to address manufacturing challenges from design to end products
- Support an end-to-end innovation 'ecosystem' in the U.S. for revolutionary fibers and textiles manufacturing and leverage domestic manufacturing facilities to develop and scale-up manufacturing processes
- Provide rapid product realization opportunities, based on robust design and simulation tools, pilot production facilities, a collaborative infrastructure with suppliers, and workforce development opportunities through targeted training and curriculum programs

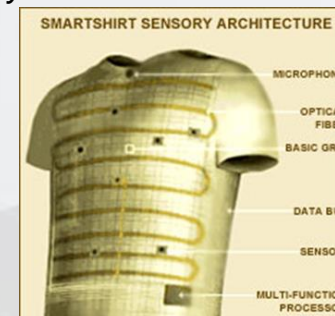
Transportation – Covers and Airbags    Geosynthetics – Construction



Military and Commercial Shelters



Military and Commercial Smart Clothing



**POTUS Announcement – March 18th 2015**

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# Building the Network: Network Status and Growth Plans

## INSTITUTES IN FY15 COMPETITION/DEVELOPMENT



## ESTABLISHED INSTITUTES



**Full Network Goal: 45 Regional Hubs**

## Other Institutes in FY16 Planning:



Open topic competition – addressing “white space” between mission agency topics



Selected topic competitions supporting Agency mission – using agency authorities and budgets

**Dept. of Commerce Planning:**  
FY17-26 – Central (DOC-managed) fund proposed for remaining institutes, via open topic process



# **NNMI Authorized: Revitalize American Manufacturing & Innovation Act**

## *118 bipartisan RAMI Bill Sponsors*



Rep. Tom Reed  
R NY-23



Rep. Joe Kennedy  
D MA-4



Sen. Sherrod Brown  
D Ohio



Sen. Roy Blunt  
R Missouri



September 15, 2014 –  
Passed House  
**100 Cosponsors (51D, 49R)**



December 11, 2014 –  
Passed Senate with 2015  
Appropriations  
**18 Cosponsors (10D, 7R, 1I)**



December 16, 2014 –  
Signed By President Obama

*Bipartisan Momentum Supporting the NNMI Initiative*



# Summary:

## A U.S. Game Changing Opportunity

- Establish a presence, at scale, in the “missing middle” of advanced manufacturing research
- Create an Industrial Commons, supporting future manufacturing hubs, with active partnering between all stakeholders
- Emphasize/support longer-term investments by industry
- Combine R&D with workforce development and training
- ***Overarching Objective: Unleash new U.S. advanced manufacturing capabilities and industries – for stronger global competitiveness and U.S. economic & national security***

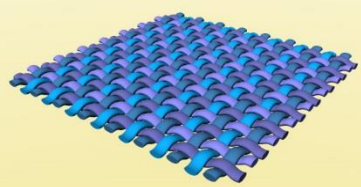


# ***Thank you***

*For questions regarding the DoD Revolutionary Fibers and Textiles Manufacturing Innovation Institute Funding Opportunity Announcement, contact the RFT-MII acquisition team.*

[\*www.proposersday.org\*](http://www.proposersday.org)

Unless otherwise labeled, images are courtesy of The White House, the National Institute of Standards and Technology, and Shutterstock



# Break

## REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE PROPOSERS' DAY

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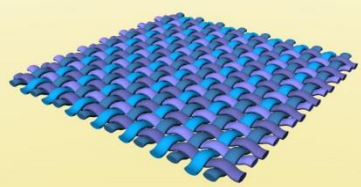
# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

## PROPOSERS' DAY

### FOA Technical Overview

Mr. Stephen Luckowski/ Ms. Carole  
Winterhalter



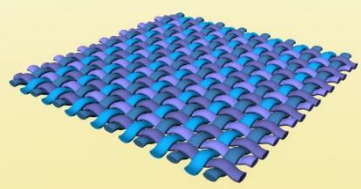


# Agenda

- Introduction
- Government Team
- Background and Goals
- Vision
- Technology Focus Areas (Definitions)
- Example Applications
- Scope and Relationships
- Role of the Institute (Project Objectives)
- Evaluation Criteria
- Summary







# Introduction

- In 2014, the Government surveyed industry, through a Request for Information (RFI), on six technology areas to determine the prospect of a Manufacturing Innovation Institute (MII)
  - Based on positive feedback from industry and academia, Revolutionary Fibers and Textiles (RFT) was chosen to move forward
- Over the last six months, the government has been developing a concept for the role this MII can play as a public/private partnership to help strengthen this sector in US economy
- A team of government technology experts has been assembled to develop the technical requirements for this Institute and develop the Funding Opportunity Announcement (FOA)
- The SME team has broad representation across the services and other government agencies

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# Government Team

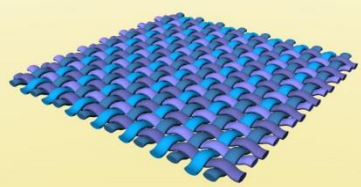
- **OSD Leadership and Support:** Adele Ratcliff, Director OSD ManTech
- **Institute Leadership:** Army-led government team
  - Program Manager: Steve Luckowski, US Army ARDEC (Armaments Research Development and Engineering Center)
  - Chief Technical Officer: Carole Winterhalter NSRDEC (Natick Soldier Research Development and Engineering Center)
  - Contracting: Travis Clemons, Lauren McDermott, ACC-NJ (Army Contracting Command-NJ)
- **SME Team:** Comprised of Subject Matter Experts (SMEs) from across the government (Army, Navy, Air Force, Marine Corps, DLA, NASA, DOE, DOC, NIST, NSF)



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# Background and Goals

## Background:

- Based on RFI and government SME inputs, the fibers and textiles industry faces challenges in:
  - Geographic dispersion
  - Lack of capability in specific technology areas (supply chain voids)
  - Manufacturing scalability and flexibility
  - Lack of modeling and simulation tools to facilitate predictive design
  - Availability of a robust knowledge database that provides validated performance data

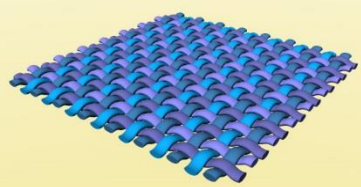
## Goals:

- Support an end-to-end 'ecosystem' in the U.S. for RFT that includes domestic facilities to scale-up manufacturing processes
- Be the innovation engine for manufacturing and design and a demonstration platform for industry
- Increase product performance, affordability, and market demand by fostering agile manufacturing advances
- Support applied R&D projects that enable new processes, equipment, design tools, and capabilities
- Develop next-generation products and prototypes using highly trained labor and state-of-the-art technology and equipment
- Capability to rapidly and flexibly produce end-item prototypes using validated computational design tools and a robust knowledge management system

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# Vision

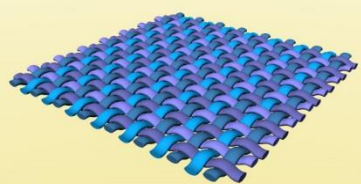
- **Establish a national manufacturing institute where both defense and commercial customers can access pilot-scale quantities of fibers and textiles that are:**
  - Cost-effectively produced, independent of economy-of-scale
  - Rapidly customized for defense (small unit/mission/requirement) or commercial applications
  - Supported by a domestic supply chain that is flexible, responsive, and affordable
- **Establish a national manufacturing institute with the following attributes:**
  - Financially self-sustaining, world-leading, innovation hub that brings together private and public entities to develop and accelerate adoption of innovative next generation manufacturing technologies
  - Institute leadership team that has demonstrated experience and capability
  - Supports a core set of shared, applied Research and Development (R&D) infrastructure that provides a clear center of gravity for the Institute and enables affordable access to physical and virtual tools
  - Leaders in the ability to design, manufacture, test, validate, and field advanced fibers and textiles technologies
  - Establish, execute and assess an annually reviewed manufacturing applied R&D technical strategic plan for the institute
  - Engage small and medium enterprises, leverage relevant private/public sector resources (Manufacturing Extension Partnership {MEP}, national labs, university centers, etc.)
  - Provide capabilities for and collaboration on open, pre-competitive work
  - Establish a technical education and workforce development plan of strategic impact

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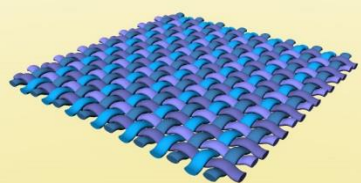




## Technology Focus Areas (Definitions)

- **Fibers** – Monofilament and multifilament synthetic and natural fiber blends, Multicomponent and multimaterial fibers, and conductive fibers
- **Yarns** – Continuous strand of textile fibers, filaments, or material in a form suitable for weaving, knitting, or otherwise intertwining to form a textile fabric. Yarn occurs in the following forms: (1) a number of fibers twisted together (spun yarn); (2) a number of filaments laid together without twist (a zero-twist yarn); (3) a number of filaments laid together with a degree of twist; (4) a single filament with or without twist (a monofilament); or (5) a narrow strip of material, such as paper, plastic film, polymeric tape or metal foil, with or without twist, intended for use in a textile construction
- **Technical Textiles** – Fabrics used for non-decorative purposes where functional properties are of primary importance. Includes smart fabrics, E-textiles in a range of applications.





# Definition of Technical Textiles

 Agrotech horticulture, landscaping, gardening, agriculture crop covers, seed blankets, weed control fabrics, greenhouse shading, root bags, biodegradable plant pots, capillary matting cover, protection and collection, fishing and tying	 Buildtech commercial, residential and industrial buildings, building construction, and engineering roofing and tile underlay, underslating, thermal and noise insulation, house wrap, facings for plaster board, pipe wrap, concrete moulding layers, foundations and ground stabilization, vertical drainage, protection and display, textile construction, building components, reinforcements and high quality wallpaper, shelters/habitats (e.g.; protection from weather, radiation), inflatables (e.g.; space structures, blimps, weather balloons)	 Clothtech garments, clothing, and shoes shoe components, insulation and structure, sewing products, interlining, cleanroom garments, shoe and leather goods
 Defensetech soldier clothing (wearable e-textile power and data transport bus), microclimate management and individual equipment, shelters, parachutes, ballistic and blast protection, CBRN, flame and thermal protection, environmental protection, safety flotation devices, anti-gravitational suits	 Geotech road infrastructure, railways, irrigation and hydraulic structures, landfills, dams, asphalt overlay, soil stabilization and reinforcement, drainage, sedimentation and erosion control, drainage channel liners, separation, reinforcement, filtration, offshore land reclamation, breakwaters, roadside, river/canal banks, reservoirs, and slope protection	 Hometech furniture, upholstery, interior furnishing, rugs, floor coverings Carpet components, furniture components, consumer wipes (baby, personal and household wipes), and industrial wipes (foodservice, general industrial general, industrial specialty and medical wipes), air and water filtration, interior design, drapes, covers, tickings, and composites

- **Technical textiles covers a broad spectrum of market applications. The Government does not expect proposers to address all the applications listed below -- choose application areas which support defense and commercial interests and where you believe you can create a sustainable Institute.**
  - **Agrotech** – horticulture, landscaping, gardening, and agriculture crop covers, seed blankets, weed control fabrics, greenhouse shading, root bags, biodegradable plant pots, capillary matting cover, protection and collection, fishing and tying
  - **Buildtech** – commercial, residential and industrial buildings, building construction, and engineering roofing and tile underlay, underslating, thermal and noise insulation, house wrap, facings for plaster board, pipe wrap, concrete moulding layers, foundations and ground stabilization, vertical drainage, protection and display, textile construction, building components, reinforcements and high quality wallpaper, shelters/habitats (e.g.; protection from weather, radiation), inflatables (e.g.; space structures, blimps, weather balloons)
  - **Clothtech** – garments, clothing, and shoes shoe components, insulation and structure, sewing products, interlining, cleanroom garments, shoe and leather goods
  - **Defensetech** – soldier clothing (wearable e-textile power and data transport bus), microclimate management and individual equipment, shelters, parachutes, ballistic and blast protection, CBRN, flame and thermal protection, environmental protection, safety flotation devices, anti-gravitational suits
  - **Geotech** – road infrastructure, railways, irrigation and hydraulic structures, landfills, dams, asphalt overlay, soil stabilization and reinforcement, drainage, sedimentation and erosion control, drainage channel liners, separation, reinforcement, filtration, offshore land reclamation, breakwaters, roadside, river/canal banks, reservoirs, and slope protection
  - **Hometech** – furniture, upholstery, interior furnishing, rugs, floor coverings Carpet components, furniture components, consumer wipes (baby, personal and household wipes), and industrial wipes (foodservice, general industrial general, industrial specialty and medical wipes), air and water filtration, interior design, drapes, covers, tickings, and composites

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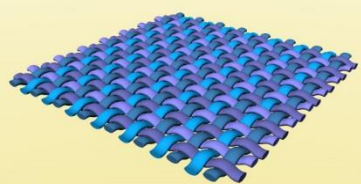


- **Indutech** — filtration, cleaning, chemical processing, mechanical engineering Electrical components (cable insulation, insulation tapes and microfilters), filtration and separation (air, liquid and gases), satellite dishes, clothing surfacing tissues/veils, conveyor belts, reinforced plastics, PVC substrates, flame barriers, noise absorbents, battery separators (alkaline, acid and fuel cells), anti-slip matting, airbags, lifting and pulling equipment (belts, straps). Other applications include; airbags (cars, aircraft and planetary probes), solar or sailing sails, tethers and harnesses (space and terrestrial), aircraft seats and interiors (nonflammable).
- **Mobiltech** — non-structural applications in cars, ships and aircraft, space travel boot liners, parcel shelves, heat shields, shelf trim, molded bonnet liners, boot floor covering, fuel/oil filters, headliners, rear parcel shelves, airbags, cabin air filters, engine intake and exhaust air filters, silencer pads, insulation materials, car covers, under padding, car mats, tapes, backing for tufted carpets, seat covers, door trim, and insulation, floorcoverings, protection, and composites<sup>2</sup>
- **Oekotech (Envirotech)** — environmental protection, recycling and waste disposal facilities, wastewater treatment plants, landfill liners and capping systems, gas venting wastewater filters, oil absorbent, single use biodegradable textiles, exhaust air filtration, dust collection, leak oil absorbent, gas and odor removals
- **Packtech** — packaging protective cover systems, and container systems bulk packaging with predefined 3D structure, scrap and disposables, spacer and tying and absorbent food pads<sup>2</sup>
- **Protech** — person and property protection, ballistic and blast protection, chemical and biological protection, particulate protection (Clean room suits), heat and flame protection, cut resistance, shields and gowns worn in emergency response, chemical handling, hazardous waste control and disposal, cleaning and filtration<sup>2</sup> ballistic and blast protection, chemical/biological/radiological/nuclear
- **Sportech** — sport and leisure, active wear, microclimate management, outdoor sports, luggage components, sports equipment, sportswear, wipes, covers, disposables and camping equipment<sup>2</sup>

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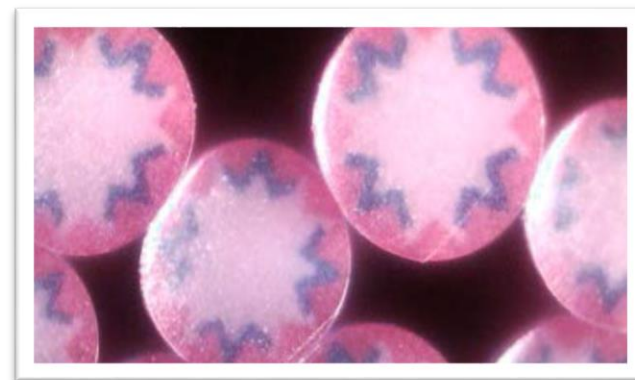
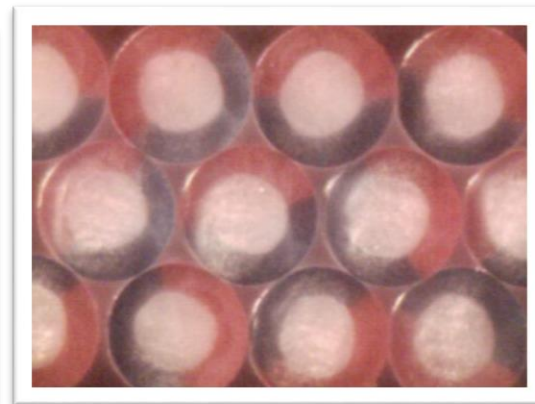
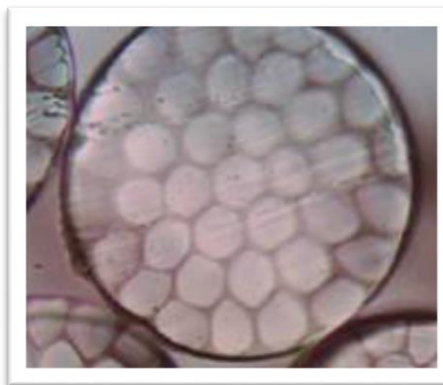


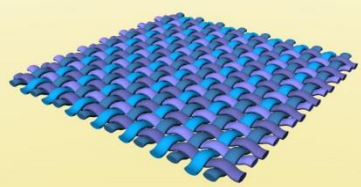




# Technology Focus Areas (Definitions): Fibers

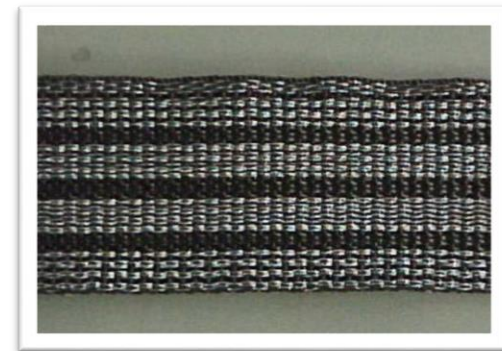
- High Strength-to-Weight Fibers
- “Sense and Respond” Fibers
- Biomimetic Fibers
- Biodegradable Fibers
- Mono/Bi/Tri Component Fibers
- Photovoltaic Fibers
- Anti-static Fibers
- Coatings and Other Functional Finishes:
  - Antimicrobial
  - Super omniphobic surface treatments
  - Advanced C6 formulations for water and oil resistance
  - Selectively permeable membranes with high MVTR
  - Improved fiber functionality (metal organic frameworks, polyoxometallics)

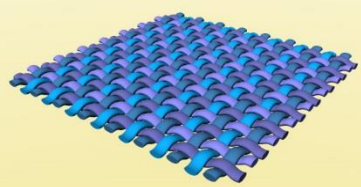




# Technology Focus Areas (Definitions): Yarns

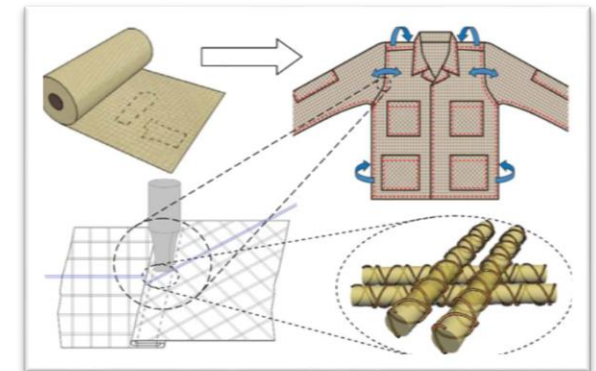
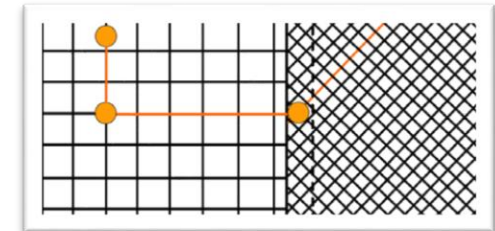
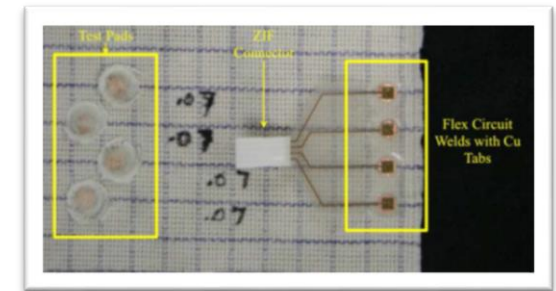
- Novel Polymeric Tapes
- Non-Chlorofluorocarbon (or Fluorocarbon) Polymeric Tapes
- Thin Films and Materials for Flexible Hybrid Electronics (FHE) Applications
- Electronic Yarns (eYarns):
  - Combinations of electronic and traditional materials
  - Conductivity – copper wrap around existing yarns
  - Functionality (embedded antenna)



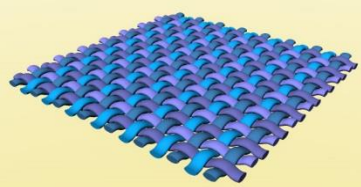


# Technology Focus Areas (Definitions): Technical Textiles

- **Textiles and Treatments**
  - Water-repellant, C4 types of treatments, etc.
- **Temperature Adaptive “Smart” Insulation**
- **Low Cost, Flame Resistant Fabrics**
- **Thermal Insulation with Low Bulk**
- **Smart Materials that Adapt to Hot and Cold Weather (active or passive)**
- **High Performance Seaming and Closure Systems**
- **eTextiles:**
  - Power and data transmission through fabrics and interconnectivity with electronics
  - “Systems Integration” – electronics integration/energy harvesting
  - Seaming and Joining – maintain electrical pathway

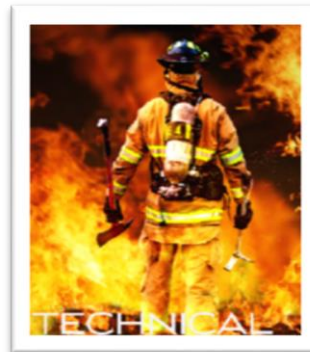
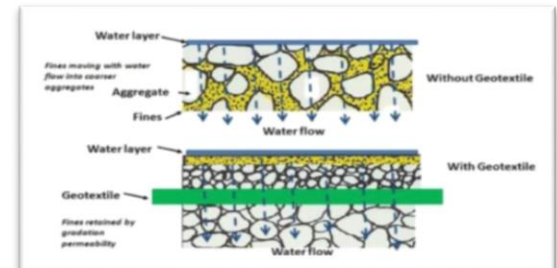
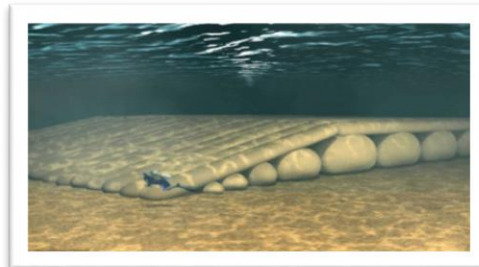






# Example Applications: Commercial

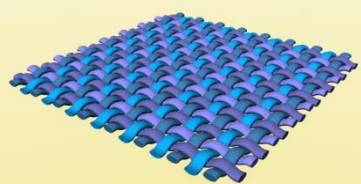
- First Responder Uniforms
- Mechanical Filtration
- Automotive Airbags
- Artificial Reefs/Beach Erosion Prevention
- Reinforcement Structures (Mechanically Stabilized Earth Walls)



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# Example Applications: Defense

- Personnel Parachuting and Cargo Airdrop Systems
- Softwall/Rigidwall Shelters and Base Camp Systems
- Integrated Soldier Power and Data System
- Soldier Uniforms (Thermal management, Chemical/Biological/Radiological/Nuclear-CBRN protection, etc.)

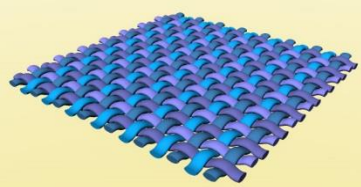


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# Scope and Relationships

- The RFT-MII will have a close relationship and share common goals with other allied technology areas supported by other Institutes (Example: Flexible Hybrid Electronics and Composites)

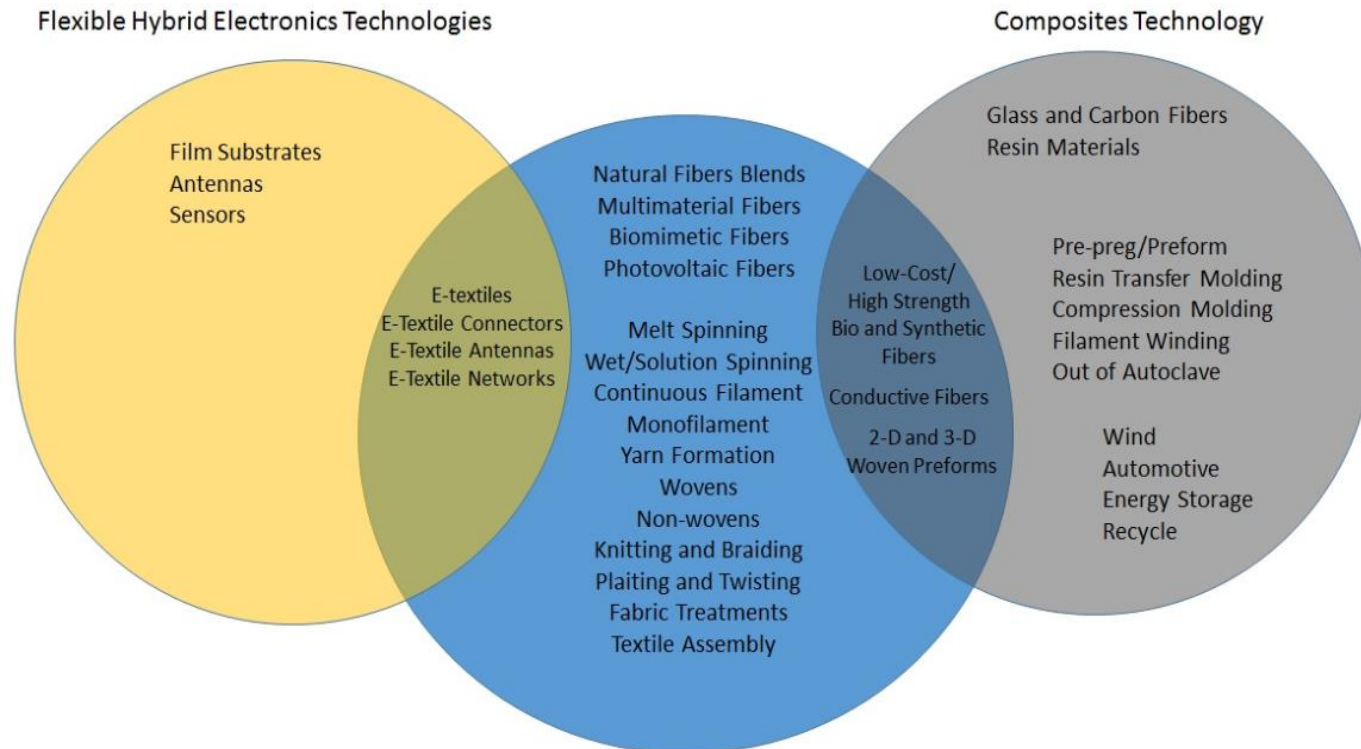
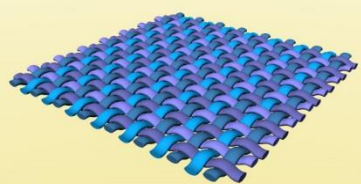


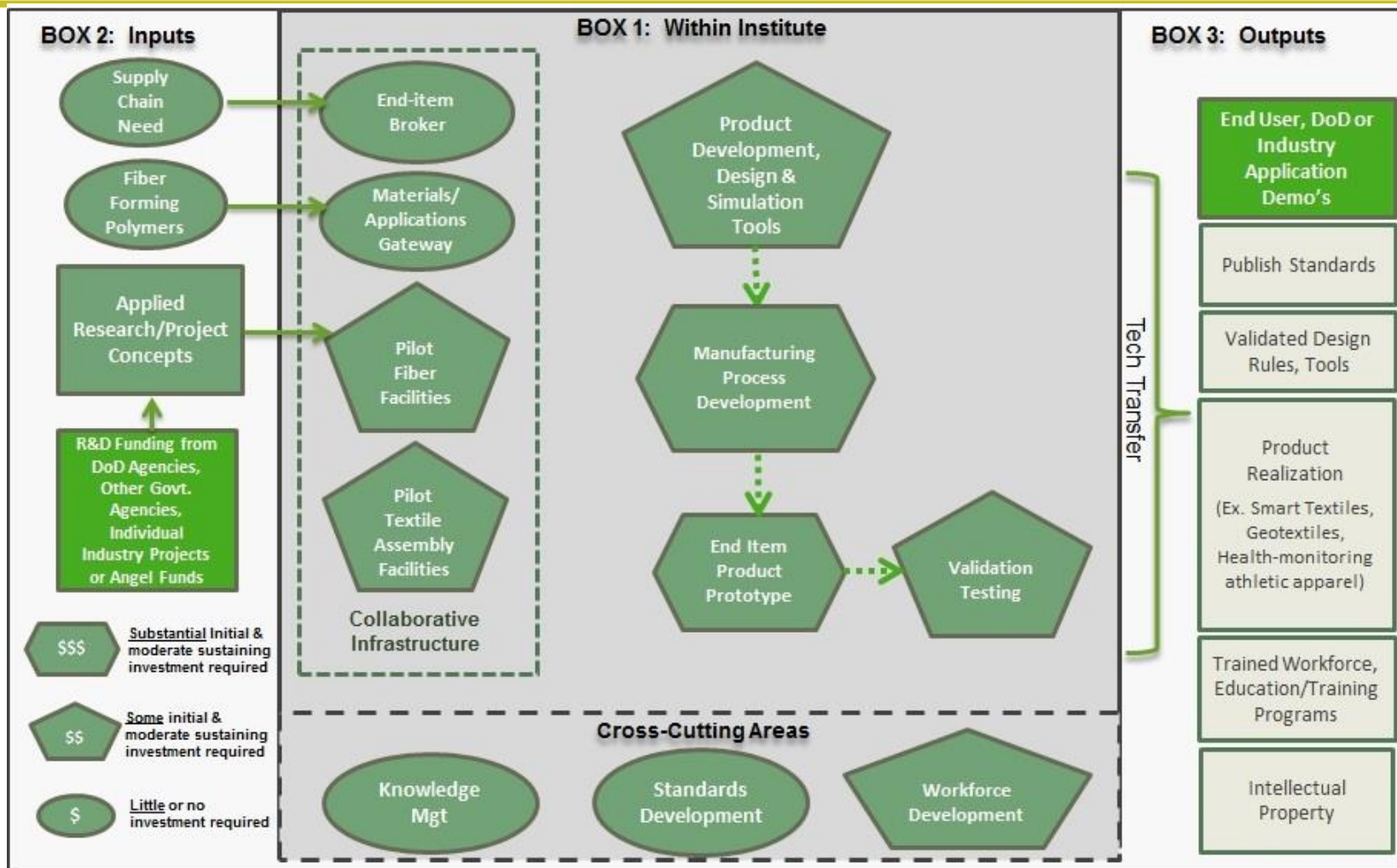
Diagram 1 - Revolutionary Fibers and Textiles Scope and Relationships







# Role of RFT-MII (Project Objectives): Conceptual Operational Ecosystem

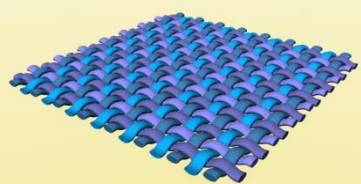


This conceptual RFT-MII Operational Ecosystem is intended to guide offerors in their responses, but it does not represent a required technical approach.

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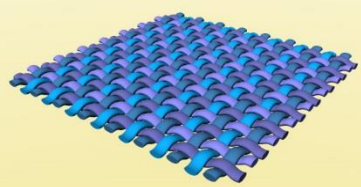
# Technology/Manufacturing Readiness Levels

NNMI Target	TRL 1:	Basic principles observed and reported	MRL 1:	Manufacturing feasibility assessed
	TRL 2:	Technology concept and/or application formulated	MRL 2:	Manufacturing concepts defined
	TRL 3:	Analytical and experimental critical function and/or characteristic proof of concept	MRL 3:	Manufacturing concepts developed
	TRL 4:	Component and/or breadboard validation in a laboratory environment	MRL 4:	Capability to produce the technology in a laboratory environment
	TRL 5:	Component or breadboard validation in a relevant environment	MRL 5:	Capability to produce prototype components in a production relevant environment
	TRL 6:	System/subsystem model or prototype demonstration in a relevant environment	MRL 6:	Capability to produce prototype system or subsystem in a production relevant environment
	TRL 7:	System prototype demonstration in an operational environment	MRL 7:	Capability to produce systems, subsystems or components in a production relevant environment
	TRL 8:	Actual system completed and qualified through test and demonstrated	MRL 8:	Pilot line capability demonstrated; Ready to begin Low Rate Initial Production
	TRL 9:	Actual system proven through successful mission operations	MRL 9:	Low rate production demonstrated; Capability in place to begin Full Rate Production

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# Project Objectives: Collaborative Infrastructure (CI)



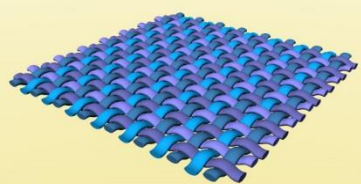
- The Collaborative Infrastructure is a collection of facilities and capabilities enabling innovative fiber and textiles prototype manufacturing, process development, and supply chain coordination
  - May consist of technical expertise, physical infrastructure and equipment assets both within the Institute and those that are shared with industry partners as part of a network
    - What's required for simulation, design, rapid prototyping/manufacturing and scale-up activities of fiber materials and textile assemblies
  - Can provide a more integrated supply chain for new product development by configuring the manufacturing processing at a scale that is currently unavailable or too costly for product developers
- Includes four components:
  - End Item Product Broker
  - Materials / Applications Gateway
  - Pilot Fiber Facilities
  - Pilot Textile Assembly Facilities

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# Project Objectives:

## CI – End-Item (Product/Process) Broker

End-item  
Broker

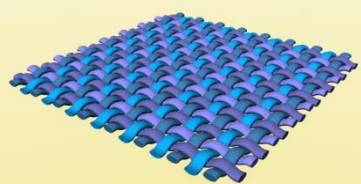
Little or no  
investment required

- In its capacity as an End-Item Broker, the Institute will:
  - Use its detailed knowledge of the manufacturing ecosystem to help provide partnership opportunities for OEMs to develop and mature supply chains, based upon product needs
  - Assist in matching customers' needs to the most appropriate materials and/or applications
  - Facilitate the rapid design, manufacture, and testing of new combinations of fiber materials and textiles
  - Explore manufacturing technology improvements in fibers, textiles, and functional finishes
  - Develop end-item prototypes through use of the collaborative infrastructure
  - Leverage industry cost share, through its membership, to provide rapid access to equipment necessary to realize an end-item prototype
  - Develop and refine a competency in value stream, gap, and failure analysis as well as identify solutions on how these vulnerabilities can be overcome

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# Project Objectives:

## CI – Materials/Applications Gateway

Materials/  
Applications  
Gateway

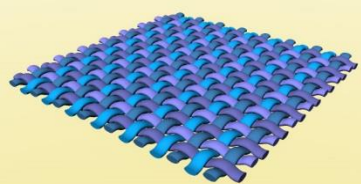
Little or no  
investment required

- The role of the Materials and Applications Gateway will be to:
  - Become aware of and catalog new materials (TRL/MRL 4 and above) and applications
  - Characterize and document materials, fiber, and fiber forming polymer processing conditions in a shared knowledge management system
  - Apply design and simulation tools to more accurately predict performance
  - Enable the virtual application of new/existing materials to new textile combinations in the modeling and prototyping phases
  - Provide opportunities for knowledge-based hybridization of fiber materials
  - Broaden the applications for these materials
- Function as an ‘honest broker’ in documenting materials performance and functional finishes
- Support the Broker function by facilitating the development of applications where the supply chain is currently unavailable

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# Project Objectives:

## CI – Pilot Fiber Facilities



Some initial &  
moderate sustaining  
investment required

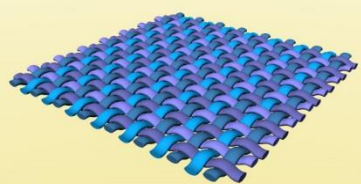
- **The Pilot Fiber Facilities will be a capability to support:**
  - Fiber performance improvement through modification of fiber materials provided by the Materials/Applications Gateway function
  - Low volume fiber manufacture within the physical infrastructure and post-pilot scale-up within the collaborative infrastructure
  - Wide-range of conventional manufacturing processes (melt-spinning, wet solution-spinning, mono bi-component extrusion)
  - Small-scale and intermediate-scale processes currently missing in both academia and industry
  - Full characterization of enhanced performance fibers, using design and simulation tools, to extend fiber performance into textile products
- **Within the Institute's physical infrastructure, there needs to be the capacity to have throughput to sufficiently scale and demonstrate the reproducibility of fiber properties and performance and support rapid prototyping, testing and evaluation of related end items**

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# Project Objectives:

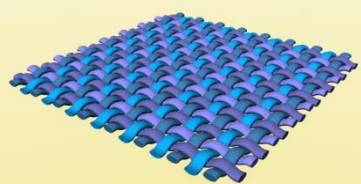
## CI – Pilot Textile Assembly Facilities



Some initial & moderate sustaining investment required

- **Pilot Textile Assembly Facilities should:**
  - Have a flexible assembly capability with advanced support for 2-D and 3-D fabric formation
  - Be supported by robust design and simulation tools which enable the functionalization and hybridization of fibers into novel product applications
  - Support the fabrication of novel structures from polymer, fiber or yarn to finished fabric, focusing on the textile as opposed to a garment, or end-item product
- **Through both a physical and collaborative infrastructure, this functional area should encompass the ability to:**
  - Produce small quantities of fabrics in various patterns and sizes
  - Dye, print and finish small batches of fabric
  - Rapidly produce and evaluate small quantities of test items from that same fabric
  - Include processes such as yarn spinning, 2D/3D weaving, 3D printing, knitting, braiding, including nonwoven technology
  - Produce e-textiles that incorporate sensors for dedicated applications and/or support the 'Internet of Things' (IoT)
  - Include fabric forming, sewing, and bonding methods/equipment





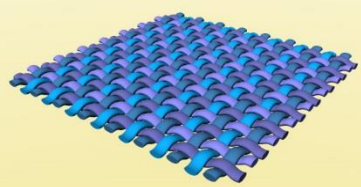
## Example Physical Infrastructure (Appendix B, Table 4)

Manufacturing Process Description	Manufacturing Capability (Equipment)	MII Physical Infrastructure Output (units/time)	MII Collaborative Infrastructure Output (units/time)
<b>Pilot Fiber Manufacturing Facility</b>			
Fiber spinning	Solution spinning (bi-component)	1 lb./hour	50 tons/year
Fiber spinning	Melt spinning	1 lb./hour (quad component)	50 tons/year (tri component)
<b>Pilot Textile Assembly</b>			
Long Staple Yarn Processing Equipment	Card and Tow packer for long staple synthetic blend yarns		
Non-Woven Fabric Formation line	Web Bonding via hydro-entanglement		
Hot embossing Fabric Finishing line	Micro to Nanoscale – roll to roll		
Metalized and Semi-Conductive Fabric coater	Vacuum deposition chamber – roll to roll, with chamber		
Knitting machines	Seamless, Complete garment. CAD/CAM		
<b>End-item Product Assembly</b>			
Stitch less Seaming Technology	Ultrasonic Fabric sealing System		
<b>Others as needed</b>			

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# Project Objectives: Product Development, Design and Simulation Tools



Some initial &  
moderate sustaining  
investment required

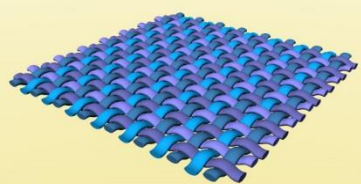
- Product Development, Design and Simulation Tools that can facilitate predictive design and will be supported by a robust knowledge management system that provides validated performance data for fibers and textile assemblies
- Supported by the development of Textile Design Automation (TDA) tool(s) that seamlessly incorporate(s) all aspects of design from end-to-end, from fiber to finished product
  - Physics-based modeling of fibers and textiles (computational chemistry, molecular modeling, transport modeling, 2-D and 3-D structures)
  - Based on robust knowledge management capability and validation testing
  - Leverage tools developed by allied industries (Ex. Composites) in order to support a full range of design and modeling
  - Incorporates empirically-based approaches that facilitate product design, product development, cost analysis, and trade-off studies

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# Project Objectives: Manufacturing Process Development

Manufacturing  
Process  
Development

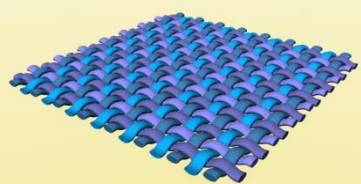
**Substantial Initial &  
moderate sustaining  
investment required**

- Conduct innovative Manufacturing Process Development and technology improvements using the collaborative infrastructure of the Institute in both fibers and textiles
- The Manufacturing Process Development function will focus on a variety of factors, including:
  - Processing conditions
  - Control technology
  - In-process QC/QA
  - Incorporation of modeling and simulation
  - Energy efficiency
  - Automatic to reduce “touch” labor
  - Sustainability
  - Environmental stewardship
- Support for process advancement and refinement such as reduction of number of steps, improvements on quality and yield, addition of automation, etc.

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# Project Objectives: End-Item Product Prototype

End Item  
Product  
Prototype

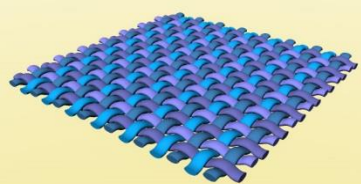
Substantial Initial &  
moderate sustaining  
investment required

- **The End-Item Product Prototype is the capability to provide rapid product realization on a small-scale, within the Institute's physical infrastructure, by integrating fibers, textiles, assembly and validation in the pilot manufacturing capabilities**
  - Includes capabilities provided by the Institute, industry and academia for novel end-item assembly and rapid prototyping across many applications
  - Provides for opportunities for student practical training and internships
- **Includes organic capability to prototype at many stages of manufacturing as well as some discrete processes, outside the Institute, to support the realization of end-item products**
  - Since most Institute activities will result in an end-item prototype, the Institute's physical infrastructure will be configured to be a resource for this activity
- **"Smart Luggage" Example**
  - Integrating GPS tracking capability into a smart fabric for luggage
  - Broker function: helps select appropriate fibers, develops manufacturing method
  - Physical infrastructure: makes prototype quantities, assembles full-scale, end-item prototype (e.g. a luggage sample)
    - Broker function obtains capability to do this from CI when Institute can't
  - Validation Testing: validates the design
  - CI function: facilitates pilot-scale manufacturing to enable commercialization of the product

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# Project Objectives: Validation Testing



Some initial &  
moderate sustaining  
investment required

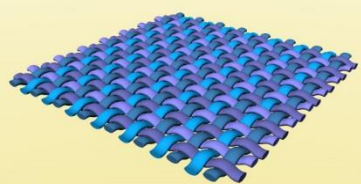
- The Validation Testing function will develop the needed testing techniques, and procure the associated equipment required to support cost-effective, high-volume end-to-end manufacture of hybrid and functionalized textile components
- Includes the capability:
  - For testing at the component and product levels
  - Within the physical infrastructure, to provide this service to members
  - To support product testing, such as human factors for garment sizing and customization
- Data gathered in component and product testing will populate the knowledge management repository and inform industry standards
  - Important for exports to countries which require certification for properties

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# Project Objectives: Knowledge Management

Knowledge  
Mgt

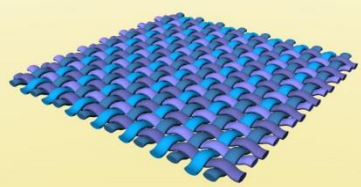
Little or no  
investment required

- Knowledge Management involves the creation and maintenance of a data repository of fiber and textile materials performance, as well as lessons learned, that:
  - Is accessible to Institute members and the wider community
  - Serves as validated/pedigreed data for input to design and simulation tools
  - Stores data on fibers, fiber combinations as well as human sizing information
  - Combines performance data with knowledge of processes
  - Contains both open source and member-restricted data, depending upon IP considerations
- The Institute should act as “community chest” of fiber and textile performance with the capability to validate material properties that are provided as part of the Materials/Applications Gateway
- The data stored in this system could provide design information and trade-off analysis that can be individually customized and thus support mass customization of wearable technology for both commercial and military applications

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# Project Objectives: Standards Development

Standards  
Development

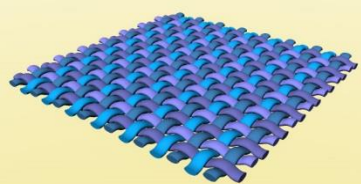
Little or no  
investment required

- **Standards Development includes creation of common industry standards and practices essential to minimize barriers in product development and supplier/customer relationships**
  - Using the collaborative infrastructure, validate material performance and work to develop and publish standards
  - Partnering with professional societies, standards organizations, and other Institutes and consortia
  - Development of test method and component standards for the emerging electronic textiles and smart fabrics areas
    - Could include electronic yarns, fabric-based networks associated wearable connectors and antennas
- **New fiber pre-forms, manufacturing processes and applications present a number of challenges ranging from fiber manufacturing to scale-up**

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# Project Objectives: Workforce Development



Some initial &  
moderate sustaining  
investment required

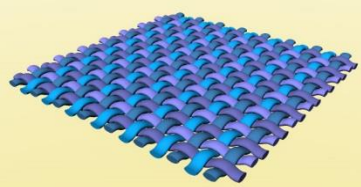
- **Workforce Development includes:**
  - Shaping and influencing positive workforce outcomes at the strategic level
  - Leveraging other activities both inside and outside (e.g. state, local, industry associations) the Institute
  - Performing and supporting the integration of education, internships, and professional training/retraining
  - Creating an educated and skilled workforce at each technical and supply-chain level
  - Development of curriculum for educational institutions including K-12, community colleges, and universities
  - Partnering with existing Science, Technology, Engineering, and Mathematics (STEM) related activities related to novel fiber and textile technologies and applications
- **The Institute should work with government-enabling agencies and organizations, such as state agencies, Departments of Education and Labor, and relevant industry associations/consortiums**
- **Integral aspect to Education and Training is free or low-cost access to design tools and software that can enable academic institutions and publicly funded research laboratories to participate in Institute resources that would otherwise be inaccessible due to high costs**

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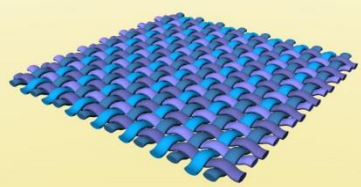


# Evaluation Criteria

## Factor 1: Business Plan

- a) **Management and Operations:** Completeness and quality of vision and plan for the proposed organization and operation of the Institute including academic institutions, industry tiers, end users, networked Institutes, and government participation as appropriate. This includes caliber, leadership, technical capabilities and successful track record of the Lead Organization, Organization Director and key personnel
- b) **Physical and Collaborative Infrastructure:** Soundness of the overall infrastructure concept proposed within existing facilities, including quality, capabilities, and availability of existing and proposed equipment
- c) **Attaining Self-Sufficiency:** Viability of the plan for the Institute to achieve financial self-sufficiency within a 5-year period
- d) **Defense and Economic Impact:** The effectiveness of the proposed strategy and execution plan to support the development of the fibers and textiles innovation ecosystem and elevate the waterline for the technology. The influence the institute will have on DOD capability and domestic small, medium and large size companies
- e) **Business Integration Strategy:** How effectively does the strategy assist in configuring supply chains (capabilities, equipment, personnel, etc.) based upon product needs as well as interface with industry associations, professional societies, and economic development entities
- f) **Intellectual Property (IP) Management:** Soundness of plan for How well the plan manages and protects IP and incentivizes private sector involvement
- g) **Cost Share:** The makeup, quality and extent of the cost share in terms of the amount, source of the cost share, and the quality/applicability of any cost share





# Evaluation Criteria, cont.

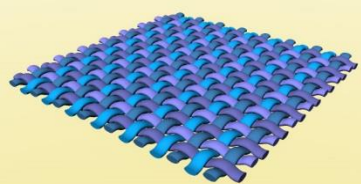
## Factor 2: Technical, Educational, and Workforce Plan Evaluations

- a) **Technical Strategy:** Overall scientific and technical merits, level of innovation of the proposed approach and ability to integrate/harmonize the capabilities of both the Physical and Collaborative Infrastructures
- b) **Innovation Beyond Current Practice:** Degree to which the applicant demonstrates an understanding of challenges in the technology areas and industry needs. Relevance and potential impact of technology transition to defense systems and other government/commercial applications for the three sample applied research projects that address the core technical areas of the RFT-MII
  - See next slide for more detail
- c) **Technical Personnel Qualifications:** The qualifications, capabilities and experience of the proposed technical personnel
- d) **Education and Workforce Development Plan:** The quality and degree of integration of educational and workforce/professional development, training and employment opportunities (such as internships) will be evaluated

## Factor 3: Cost

Includes the reasonableness and realism of the proposed cost, to include proposed cost sharing, consideration of proposed budgets and funding profiles



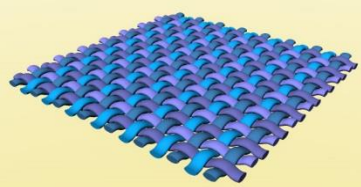


## **Evaluation Criteria: Innovation Beyond Current Practice – Sample Applied R&D Projects**

- 1. Establishment of a fiber and textile knowledge management data repository and development of design automation tools**
- 2. Innovative product realization in next-generation apparel technology**
  - Examples: concepts such as micro-climate conditioning, energy harvesting and transport and real-time health-monitoring for soldier and athletic performance wear
- 3. Innovative product realization in Next Generation non-apparel technology**
  - Examples: concepts such as electronic-enabled geosynthetic textiles, smart shelters, and smart structures.







# Summary

- **Unique opportunity to create an end-to-end innovation ecosystem for Revolutionary Fibers and Textiles in the U.S.**
  - Successful partnership between Government, Academia and Industry
  - Benefits for all involved will be substantial
  - Opportunity to network with other Manufacturing Innovation Institutes
  - Will provide technology leaps to further U.S. economic competitiveness
- **Questions will be addressed later in the day**

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# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

## PROPOSERS' DAY

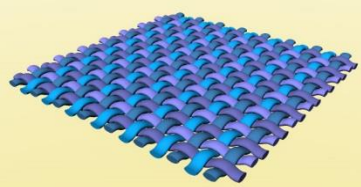
### FOA Contracting Overview

Mr. Travis Clemmons

ACC-NJ





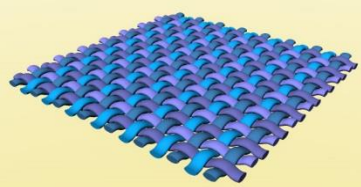


# Outline

- **General Overview**
  - Type of Recipient/Lead
  - Types of Assistance Instruments
  - Funding
  - Schedule
  - Cost Share
- **Specific Instructions**
  - Submission information
  - Format for proposals
- **Evaluation Information**
- **General Information**
- **Agency Contacts**







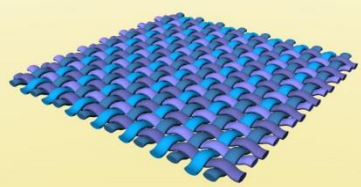
# Contracting – General Overview

- **THIS WILL BE A TWO—STEP SOLICITATION** (See Section IV Application and Submission Information for further information):
  - **First Step**: Concept Paper Due Date and Time: The deadline for receipt of concept papers is no later than 2:00 PM Eastern Time (ET) on 26 June 2015. (Concept papers will be evaluated based on the same evaluation criteria as full proposals.)
  - **Second Step**: Full Proposal Due Date and Time: Offerors whose concept papers meet the needs of the Government will receive invitations to submit full proposals. These invitations are expected to be sent by 13 Jul 2015.
- **Solicitation Request**: This publication constitutes a special competition as contemplated in 32 C.F.R. 22.320. There will be no other solicitation issued in regard to this requirement. Offerors should be alert to any FOA amendments.

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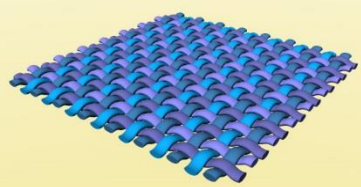
# Contracting – General Overview

- **Type of Recipient/Lead:** Independent, U.S. non-profit organizations
- **Type of Assistance Instrument:** The Government intends to award a 2 C.F.R. 200 based Cooperative Agreement. The Government reserves the right to award other assistance instruments, if deemed in the best interests of the Government.
- **Types of Assistance Instruments available:**
  - Grants
  - Cooperative Agreements
  - Technology Investment Agreements

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# Contracting – General Overview

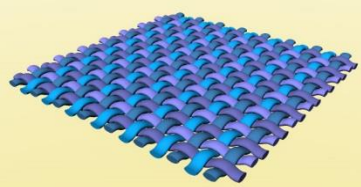
- **Grant** – A legal instrument that, consistent with 31 U.S.C. 6304, is used to enter into a relationship:
  - The principal purpose of which is to transfer a thing of value to the recipient to carry out a public purpose of support or stimulation authorized by a law or the United States, rather than to acquire property or services for the DoD's direct benefit or use
  - In which substantial involvement is not expected between the DOD and the recipient when carrying out the activity contemplated by the grant
  - No fee or profit is allowed for research entities

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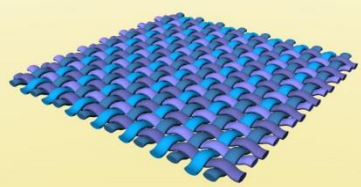




# Contracting – General Overview

- **Cooperative Agreement:** A legal instrument which, consistent with 31 U.S.C. 6305, is used to enter into the same kind of relationship as a grant (see definition "grant"), except that substantial involvement is expected between the DoD and the recipient when carrying out the activity contemplated by the cooperative agreement. The term does not include "cooperative research and development agreements" as defined in 15 U.S.C. 3710a. No fee or profit is allowed for research entities.
- **Grants and cooperative agreements are governed by the following regulations:**
  - Code of Federal Regulations (CFR): Title 2, Subtitle A, Chapter II, Part 200
  - OMB Circular A-21, "Cost Principles for Educational Institutions"
  - OMB Circular A-87, "Cost Principles for State, Local and Indian Tribal Governments"
  - OMB Circular A-102, "Grants and Cooperative Agreements with State and Local Governments"
  - OMB Circular A-110, "Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations"
  - OMB Circular A-122, "Cost Principles for Non-Profit Organizations"
  - OMB Circular A-133, "Audits of States, Local Governments, and Non-Profit Organizations"
  - DoD Grant and Agreement Regulations (DoDGARs), DoD 3210.6-R





# Contracting – General Overview

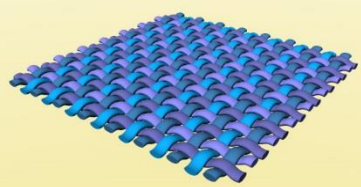
- **Technology Investment Agreement:**

- Other Transaction for Research and/or Technology Investment Agreement (TIA) – A legal instrument, consistent with 10 U.S.C. 2371 and/or 10 U.S.C. 2358, which may be used when the use of a contract, grant, or cooperative agreement is not feasible or appropriate for basic, applied, and advanced research projects. The research covered under another transaction shall not be duplicative of research being conducted under an existing DOD program. To the maximum extent practicable, other transactions for research/TIA shall provide for a 50/50 cost share between the offeror and the government. No fee or profit is allowed for research entities.
- TIAs complement other funding instruments that are available to agreements officers in that they are designed to foster civil-military integration in DOD Science and Technology (S&T) programs. Civil-military integration creates a single, national technology and industrial base upon which the DOD can draw to meet its needs. Achieving civil-military integration is a national policy objective, as stated in 10 U.S.C. 2501.
- A TIA becomes a type of assistance transaction other than a grant or cooperative agreement when its patent-rights provision is less restrictive than is possible under Bayh-Dole. The authority to award the instrument is 10 U.S.C. 2371, as well as any program-specific authority to provide assistance. Note that the agreements officer's judgment that the execution of the research project warrants a less restrictive patent provision than is possible under Bayh-Dole is sufficient to satisfy the statutory condition in 10 U.S.C. 2371 for use of an assistance transaction other than a cooperative agreement or grant (i.e., that it is not feasible or appropriate to use a standard grant or cooperative agreement to carry out the project). The TIA also may include a recovery of funds provision, as authorized by 10 U.S.C. 2371.
- TIAs give agreements officers flexibility to tailor Government requirements and lower or remove barriers to firms' participation, where the tailoring of requirements can be done consistently with good stewardship of Federal Government funds.

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# Contracting – General Overview

- **Estimated Program Funding:**

- The Federal Government (DOD) anticipates funding \$75 million (\$75M) for this Institute, distributed across five (5) fiscal years (FY)
- The Government may consider the use of two (2) additional one (1) year options at the end of the five (5) year program
- It is anticipated that other government agencies will provide additional funds, particularly for the case of basic research and targeted projects in support of the Revolutionary Fibers and Textiles Manufacturing Innovation Institute after award
- Additionally, the Institute will have the potential for executing individual industry funded projects that are not subject to cost share requirements
- The offeror must provide a minimum of \$75M of industry or other non-federal government funding to meet the required minimum 1:1 cost share

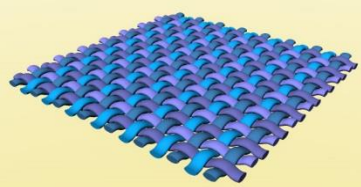
Fiscal Year	FY16	FY17	FY18	FY19	FY20	Total
Federal Govt Funding	\$15	\$20	\$20	\$15	\$5	\$75M
Industry/Non-Federal Government Cost Share (Minimum)						\$75M
Total Program (Minimum)						\$150M

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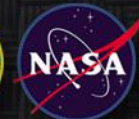
# Contracting – General Overview

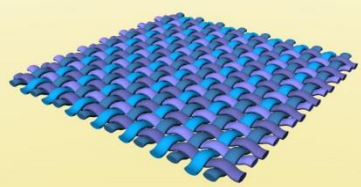
- **Schedule:**

- The period of performance will include a stand-up period of six (6) months followed by five (5) years for full Institute activities
- This six (6) month period will allow the awardee sufficient time to stand up the Institute, including prototyping facilities, collaborative infrastructure, essential components of the broker function, initial hires, membership agreements, finalizing cost share commitments, opening the manufacturing hub, establishing a governance structure, developing an intellectual property management plan, initial technology road-mapping leading to a first project call and all other precursor activities required to launch the Institute
- The Government anticipates funding in the amount up to \$5M to be made available for stand-up activities
- This amount will count as part of the \$75M overall federal government funding for the Institute
- The Institute must develop plans for long-term financial self-sufficiency, without any additional federal funding for management and operation, beyond the five years of full Institute activities
- It is also important that the Institute have plans for the creation, assessment, and completion of technical projects it undertakes, along with the various educational and training programs

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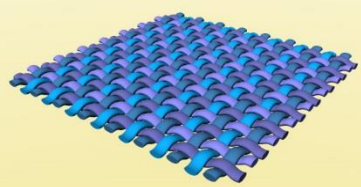
# Contracting – General Overview

- **Anticipated Number of Awards:**
  - Only one (1) award is anticipated
  - The Government reserves the right to make a single or no award as a result of this FOA

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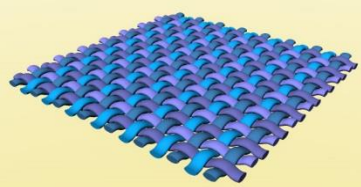
# Contracting – General Overview

- **Reporting Items:**

- 1) Institute Self-Sustainment Plan (within six months)
- 2) Funds and Man-hour Expenditure Report (Quarterly)
- 3) Recipient Progress, Status, and Management Report (Quarterly)
- 4) Presentations from Program Reviews (Semi-annually)
- 5) Strategic Business and Marketing Plan (Six months after award, then annually)
- 6) Technical Projects Reports (quarterly, and final)
- 7) Quarterly Status Report
- 8) Technical Roadmap (maximum at six months after award)
- 9) Annual Financial and Technical Reports (to include an annual DD Form 882 “Report of Inventions and Subcontracts”)
- 10) Final Financial and Technical Reports (at conclusion of the agreement)





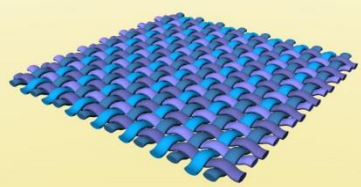


# Contracting – General Overview

- **Cost Sharing or Matching:**

- The Government requires at least a 1:1 Government:recipient cost share
  - The Government will consider state and local funding (not originating from Federal funds), as well as private-sector investment provided in support of an Institute as qualifying cost sharing. Cost sharing includes cash and third-party in-kind such as equipment, facilities, and manpower. For more detailed information on cost sharing, refer to DoDGARS 32.23 and 2CFR200.29.
  - Although offerors may not propose cost share derived from ongoing federal program funding, it is encouraged that the offeror describe any and all relevant technologies and equipment contributions that may benefit the efforts under this program
- TIA provides additional flexibility in cost share: Sources include new IR&D funds, profit or fee from another contract, overhead or capital equipment expense pool





# Contracting – General Overview

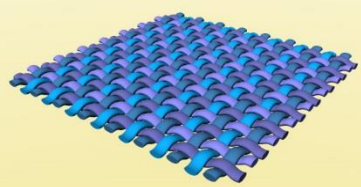
- **Federally Funded Research and Development Centers:**

- Federally Funded Research and Development Centers (FFRDCs) are not eligible to receive awards under this solicitation or exclusively team with an offeror prior to award of the cooperative agreement
- However, FFRDCs are encouraged to collaborate with all offerors during solicitation and may enter into teaming arrangements with the Institute following the award of the cooperative agreement, provided they are permitted to do so by charter, statute, and their Government sponsor
- Several FFRDCs under DOE, NASA, and DOD possess unique research and development capabilities that have demonstrated a TRL 4 to 5 for transition into the Manufacturing Institute
- Once launched, the Institute is encouraged to seek collaborations to transition technology from FFRDC research laboratories to manufacturing process scales

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# Contracting – General Overview

- **Federal Government Organizations:**

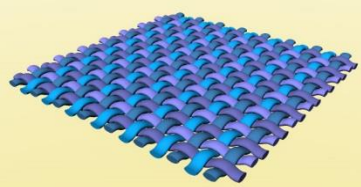
- Federal Government organizations and personnel may not participate in any proposal prior to award
- After award, the Institute is anticipated to interact with federal government organizations in a number of manners compatible with their respective purposes/missions
- These interactions will include membership on Executive and Technical Advisory Bodies, potential technical project leads with industry, and technical collaborators when appropriate for projects
- The Institute is encouraged to leverage federal government laboratories to support the program goals
- The Institute is anticipated to work with DOD organizations to support pre-commercial technology transitions to DOD Program Offices from early Institute results

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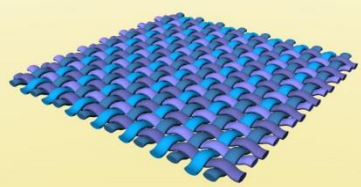


# Contracting – General Overview

- **Foreign Participation:**

- The recipient of the award will be registered as a U.S. organization. U.S. incorporated companies that are wholly owned subsidiaries of foreign companies may become eligible to be members of the Institute, and sub-awardees of federal support if they are able to demonstrate to the satisfaction of the Revolutionary Fibers and Textiles Manufacturing Innovation Institute and the DOD that:
  1. Their participation is in the best interest of the Institute, U.S. industry, and U.S. economic development
  2. Adequate IP and data protection protocols exist between the U.S. subsidiary and its foreign parent organization
  3. The work is conducted within the U.S.
  4. Other conditions that may be deemed necessary by the Institute and the Government to protect U.S. government interests are met
  5. The Institute and its members are in compliance with 8 U.S.C. 1324a and 8 CFR 274a.2
- Some projects within the Institute may be subject to export control laws and regulations. Under no circumstances may foreign entities (organizations, companies or persons) receive access to export controlled information unless proper export procedures have been satisfied
- The Institute will address participation by foreign entities (organizations, companies or persons) on a case-by-case basis, and will ensure measures that properly protect Export Controlled information



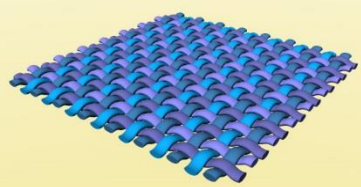


# Contracting – Specific Instructions

- **First Step (Concept Paper) Instructions:**
  - The *FIRST STEP* requests a concept paper and a rough order of magnitude (ROM) cost
  - The concept paper will include a discussion of the nature and scope of the research and the offeror's proposed technical approach
- **Due Date: 26 June, 2015**

TABLE 2 – CONCEPT PAPER FORMAT
(Maximum = 40 Pages)
SECTION 1 – Cover Page, Table of Contents (Excluded from the Page Count)
SECTION 2 – Business Plan (Maximum 20 pages)
SECTION 3 – Technical Plan (sample project page count – 3 pages each)
SECTION 4 – Educational and Workforce Development Plan (Maximum three pages)
SECTION 5 – Technical References (Excluded from the Page Count)
SECTION 6 – Biographies of key personnel (Two page each max, excluded from page count)
SECTION 7 – Rough order of magnitude cost





# Contracting – Specific Instructions

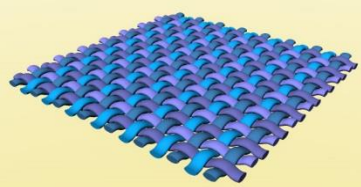
- **Second Step: Proposals for Cooperative Agreements and Assistance Instruments:**
  - The *SECOND STEP* consists of offerors submitting a full proposal within 60 calendar days of the proposal request. After receipt, proposals will be evaluated in accordance with the award criteria in Section V. below. Proposals will be categorized and subsequently selected for negotiations.
  - Technical/management and cost volumes should be submitted in separate volumes, and must be valid for 180 days
  - Proposals must reference the announcement number FOA #W15QKN-15-R-0074
  - Offerors must submit their proposal via Grants.gov
  - The cost of preparing proposals in response to the Request for Proposals is not considered an allowable direct charge to any resulting or any other contract
- **Due Date: 14 September, 2015**

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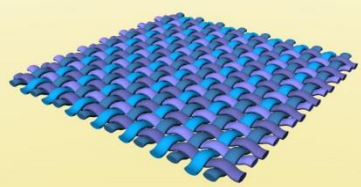
# Contracting – Specific Instructions

<b>TABLE 3 – FULL PROPOSAL FORMAT</b>
<b>VOLUME I/TECHNICAL (Maximum = 80 Pages)</b>
<b>SECTION 1 – Cover Page, Table of Contents (Excluded from the Page Count)</b>
<b>SECTION 2 – Executive Summary</b>
<b>SECTION 3 – Compliance Matrix (Excluded from Page Count)</b>
<b>SECTION 4 – Business Plan (max 48 pages)</b>
SUB SECTION A – Management and Operations
SUB SECTION B – Physical and Collaborative Infrastructure
SUB SECTION C – Attaining Self-Sufficiency
SUB SECTION D – Defense and Economic Impact
SUB SECTION E – Business Integration Strategy
SUB SECTION F – Intellectual Property (IP) Management
SUB SECTION G – Cost Share, including Proposed Budget and Letters of Commitment for cost share (Two page max each, Excluded from page count)
<b>SECTION 5 – Technical Plan (Component Goal Tables not included in Page Count)</b>
SUB SECTION A – Technical Strategy
SUB SECTION B – Innovation Beyond Current Practice, including three (3) applied R&D sample projects (six pages per sample project)
SUB SECTION C – Technical Personnel Qualifications
<b>SECTION 6 – Education and Workforce Development Plan (Five pages max)</b>
<b>SECTION 7 – Statement of Work (Excluded from page count)</b>
<b>SECTION 8 – Technical References (Excluded from the Page Count)</b>
<b>SECTION 9 – Biographies of Key Personnel (Two page each max, Excluded from page count)</b>
<b>VOLUME II/COST (No Page Count Limitation)</b>
<b>SECTION 1 – Cover Page, Table of Contents</b>
<b>SECTION 2 – Detailed Cost by Cost Element</b>
<b>SECTION 3 – Acronym Listing</b>

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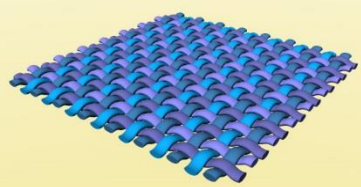


# Contracting – Specific Instructions

- **Cost Proposal Spreadsheets:**

- The cost proposal spreadsheet is required, and details of the costs (including cost share portion) associated with the entire proposed Institute
- The budget should be in the offeror's fiscal year. The cost proposal should assume an agreement start date of December 2015
- The electronic submission of the Excel spreadsheet associated with the Cost Proposal should be in a "useable condition" to aid the Government with its evaluation
- The term "useable condition" indicates that the spreadsheet should visibly include and separately identify within each appropriate cell any and all inputs, formulas, calculations, etc.
- The offeror should not provide "value only spreadsheets"
- If ACC-NJ cannot manipulate the spreadsheets in a manner sufficient for evaluation, then ACC-NJ will consider the proposal non-responsive and discard it
- As described above, offerors can find the Cost Proposal Spreadsheet Appendix C
- Click on the "Cost Proposal Spreadsheet" link and save a copy of the spreadsheet
- The form/spreadsheet has embedded instructions for completion
- For proposed subawards or inter-organizational transfers over \$150,000, offerors must provide a separate Statement of Work and fully completed Cost Proposal Spreadsheet in support of the proposed costs – along with supporting documentation





# Contracting – Specific Instructions

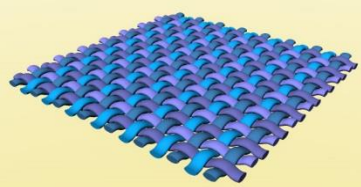
- **Compliance Matrix:**

- Offerors will provide a “Compliance Matrix” in table format (separate and exempt from total page count) that details how the offeror’s proposal addresses all the Evaluation Criteria across each of the eight Institute Requirements

Compliance Matrix Evaluation Criteria x Proposal Outline	
Evaluation Criteria	Proposal Outline
FACTOR 1 – Business Plan	
Management and Operations	
Physical and Collaborative Infrastructure	
Attaining Self-Sufficiency	
Defense and Economic Impact	
Business Integration Strategy	
Intellectual Property (IP) Management	
Cost Share	
FACTOR 2 – Technical, Educational and Workforce Plan	
Technical Strategy	
Innovation Beyond Current Practice	
Technical Personnel Qualifications	
Education and Workforce Development Plan	
FACTOR 3 – Cost	







# Contracting – Specific Instructions

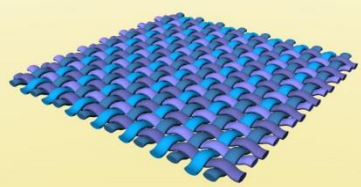
- **Submission Instructions:**

- Go to <http://grants.gov>
- The initial screen will provide the synopsis for that specific opportunity
- To view the entire opportunity, open the “full Announcement” box in the upper center of the synopsis page and select from the documents available under “Announcement Group”
- NOTE: <http://grants.gov> has tools and guiding documents in the left margin under “applicant Resources” to help you find and apply for grant opportunities
- Grants.gov requires Adobe Reader version 8.13 to open, download and save and submit an application electronically
- Adobe Reader version 8.13 is available for free from Grants.gov under “Applicant Resources,” “Download Software”

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# Contracting – Evaluation Information

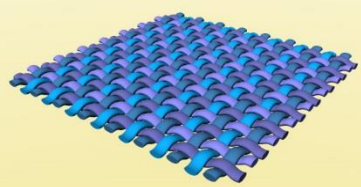
- **Evaluation Criteria:**

- Evaluation of proposals will be accomplished through a detailed review of each proposal, using the following three factors listed in descending order of relative importance:
  - The Business Plan (Factor 1)
  - The Technical, Educational and Workforce Plan (Factor 2)
  - Cost (Factor 3)
- The three evaluation criteria are not weighted equally. Factor 1 is significantly more important than Factor 2. Factor 2 is significantly more important than Factor 3.
- Detailed Business Plan (Factor 1) and Technical, Education, and Workforce Plans (Factor 2) must be addressed in the Research & Related Other Project Information (Mandatory) Form in <http://grants.gov> and the Cost Realism (Factor 3) factors are to be addressed in the Research & Related Budget (Mandatory) Form in <http://grants.gov>

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# Contracting – Evaluation Information

- **Evaluation Criteria:**

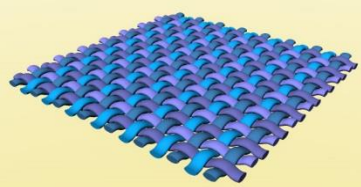
- Categories: The three factors, Detailed Business Plan, Technical, Education, and Workforce Plans, and cost proposals will be evaluated at the same time and categorized as follows:
  - **Category I:** Demonstrates technical merit. Is important to agency programs. The offeror presents relevant experience and access to adequate resources. Risk is acceptable. The cost/price is reasonable and realistic. Proposals in Category I are recommended for acceptance (subject to availability of funds) and normally are displaced only by other Category I proposals.
  - **Category II:** Demonstrates technical merit. Is important to agency programs; and presents relevant experience and access to adequate resources; but requires further development. Risk is acceptable. The cost/price is reasonable and realistic. Category II proposals are recommended for acceptance, but at a lower priority than Category I.
  - **Category III:** Does not demonstrate technical merit. Does not meet agency needs; does not present adequate experience or resources. Risk level is unacceptable; or the cost/price is not reasonable or realistic.
- No other evaluation criteria will be used. The technical and cost proposals will be evaluated at the same time. The Government reserves the right to select for award any, all, part or none of the proposal received.

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# Contracting – Other Requirements

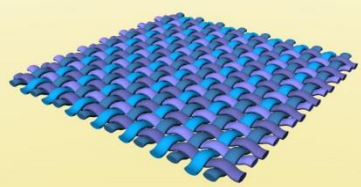
- **Other Requirements:**

- **Program security classification:** Unclassified. The government does anticipate the occasional need for classified work to be performed within the RFT-MII ecosystem in the future. To insure that these needs are met, the applicant shall discuss how their Institute will be able to execute a limited number of classified projects (to include handling of classified data). A Facilities Security Clearance may be required after award for individual classified projects.
- **Program Protection Plan:** The Government will address any critical program information (CPI) with a potential requirement for a program protection plan (PPP) generated as part of this effort as needed.
- **Operations Security (OPSEC):** The awardee will participate in the organization's OPSEC program, following appropriate OPSEC measures during the performance of this program. OPSEC requirements are required in an effort to reduce program vulnerability from successful adversary collection and exploitation of critical information. The awardee will ensure that research projects conform as required to the OPSEC and marking requirements as necessary, based on the project sensitivity level.
- **Export Control:** Export Control (International Traffic In Arms Regulation (ITAR) 22 CFR 120-131, or Export Administration Regulations (EAR) 15 CFR 710-774) do not apply to the overall Institute. However, Export Control may apply to individual applied research projects, depending on the nature of the research tasks.

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# Contracting – Contacts

- **Agency Contacts** – Address contracting or technical questions to the Contracting POC:

Lauren McDermott

Contract Specialist

ACC-NJ, ET

Email: [lauren.a.mcdermott.civ@mail.mil](mailto:lauren.a.mcdermott.civ@mail.mil)

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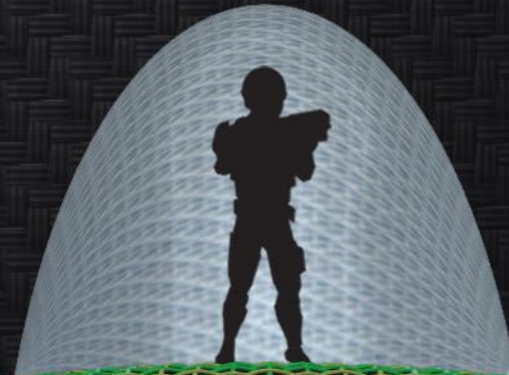




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PROPOSERS' DAY

Initial Q&A



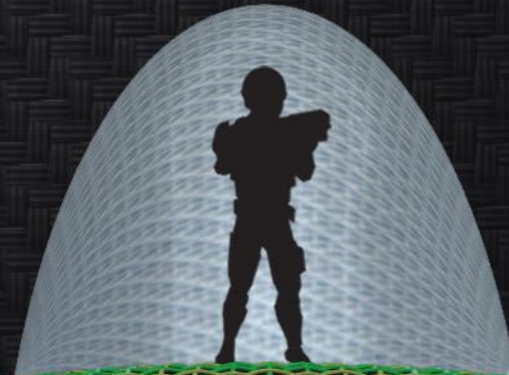
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**PROPOSERS' DAY**

**Lunch Break**



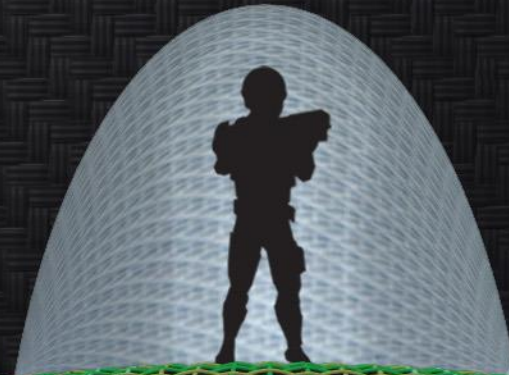


# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

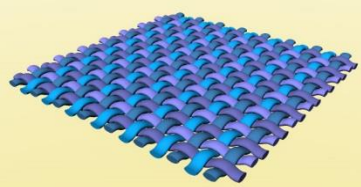
## PROPOSERS' DAY

### Flexible Hybrid Electronics Manufacturing Innovation Institute Overview

Dr. Eric Forsythe

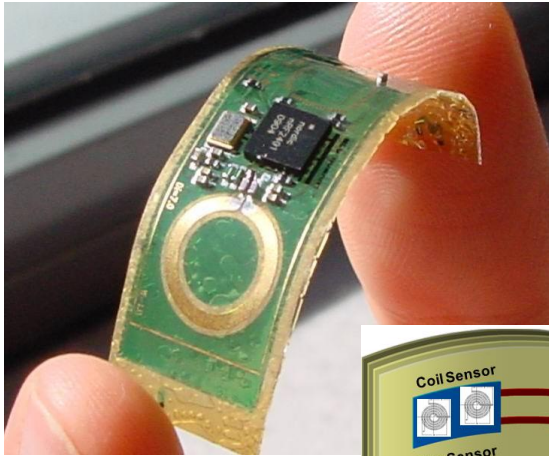






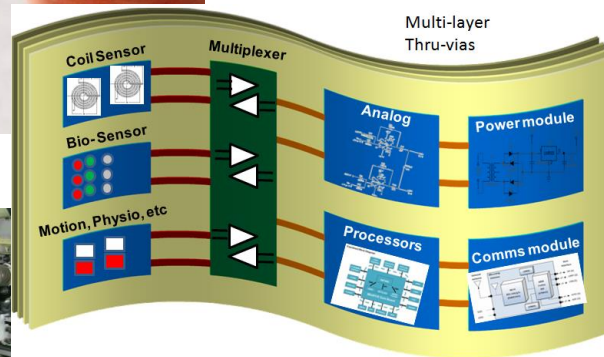
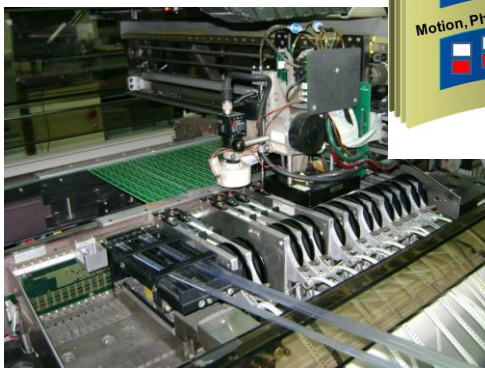
# Flexible Hybrid Electronics Manufacturing Innovation (FHEMI) Institute

## Manufacturing Focus



IMID, Keynote Address  
D Morton, 2010

Example images



Proposals Due  
June 19, 2015

## Flexible Hybrid Electronics

Highly tailorable devices on flexible, stretchable substrates that combine thinned CMOS components with components that are added via “printing” processes. This technology is identified as flexible-hybrid because it integrates flexible components such as circuits, communications, sensors, and power with more sophisticated silicon based processors.

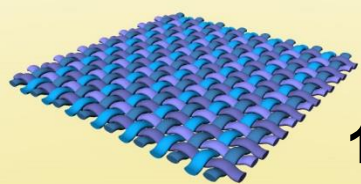
## Application Areas:

- Human performance & Medical Devices
- IoT (Unattended Sensors)
- Wearable Electronics
- Vehicle Structural Sensors
- Information devices and RF communication components
- DOD unique applications

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# Government Subject Matter Expert Team

## 160 Industry, Non-profit, and Academic Responses



Dept of Defense  
(OSD Manufacturing Technology)



DoD Lab

DTRA



Dept Army



Dept AF



Dept Navy



DMEA



Defense MicroElectronics Activity

Office Sec Defense



Dept Energy



NIST



Dept Education



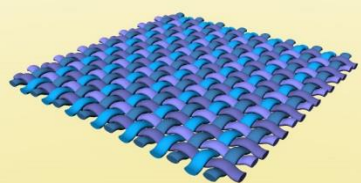
National Institute of  
Biomedical Imaging  
and Bioengineering



25 RFI Written Responses representing 40 organizations  
10 Letters of Endorsement  
102+ participants Webinar (NIST AMTECH Grant)  
12 Industry one-on-one dialogue with OSD

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# Flexible Hybrid Electronics – MII Serving Dual-Use



Training/  
Performance

Internet of Things  
Security, Intell.  
Omni-Sensing

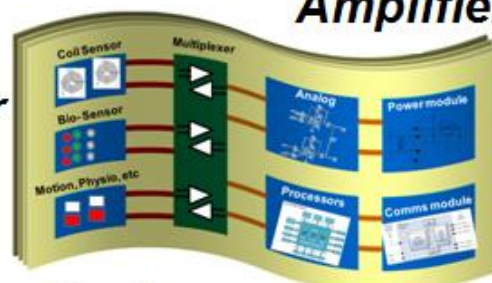


Warfighters



Medical  
Devices  
Human-Robotic  
Interfaces  
Bio-sensing

**Sensing**  
**Multi-layer**



**Computation**

**Communications**

**Power  
systems**



Business  
Wearable  
Information  
Devices



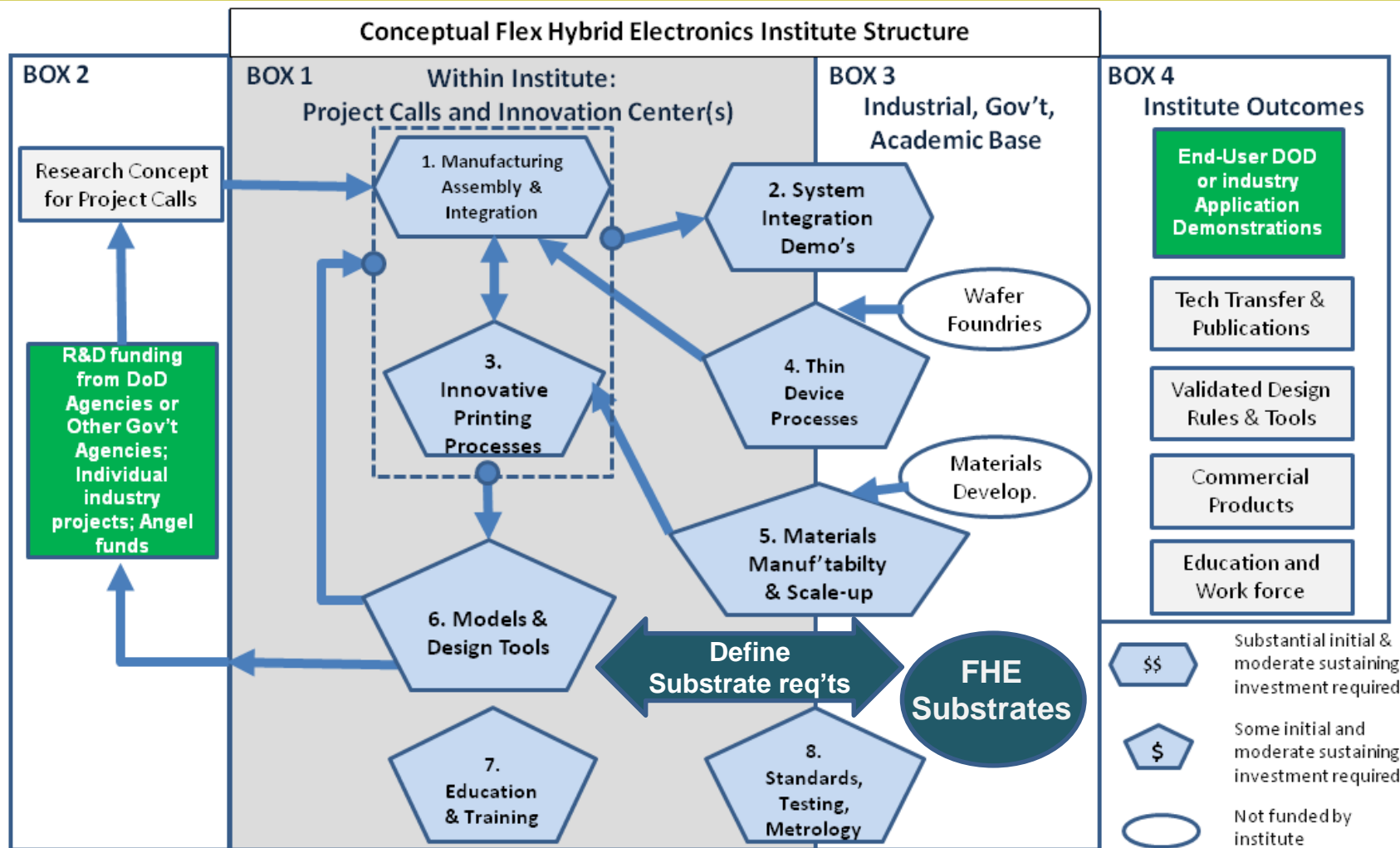
DoD Sensors  
Structural monitoring  
Manned and Unmanned platforms

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# EXAMPLE: FHE-MII Structure

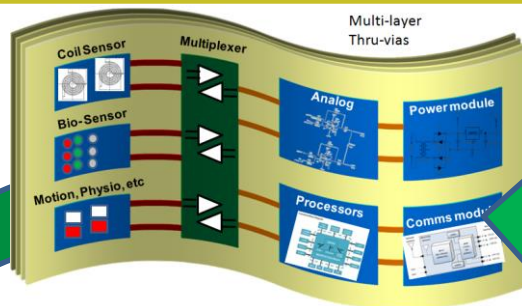
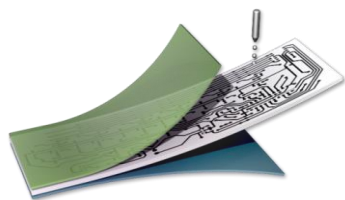


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# FHE Manufacturing Challenges



## Assembly / Integration

- Packaging (interconnects, pick & place)
- Substrate Handling (plate-to-plate, etc.)

## Packaging/System Integration & Demonstrations

- Prototype devices

## Design Rules/ Standards

- Software development
- Interface modeling
- Property databases
- Mechanical & Environmental

## Thin Device & Printing Process Development

- Wafer thinning, epitaxial lift-off
- R2R, direct-write

## Flex Hybrid Materials

- **Substrates: Work with Institutes integrating electronics on substrates**
- Inks, Adhesives, Barriers

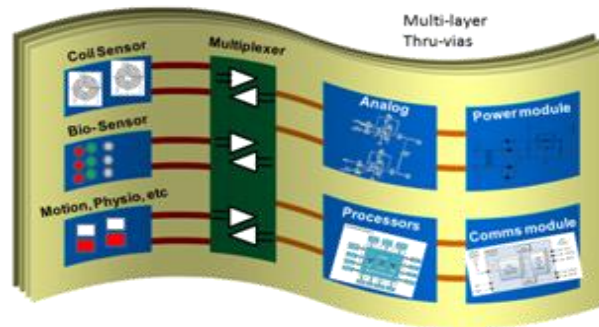
## Testing, Metrology, Qualification

- In-line testing processes
- Reliability testing

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# Example Engagement with FHE-MII



## 6.1 Ultra-fast Electron Science

**FHE:** CRADA i.e. support Materials Science & ARL Open-Campus



**EX: ARL DSI Materials**

## 6.1/6.2 Integrating FHE products for basic RD

**FHE:** produce small quantity sensors to support Human-Soldier experiments



**EX: Determining Soldier Uniqueness**

## 6.3 Direct Manufacturing Development

**FHE:** Collaboration with DOD, OGA programs

**EX: Collaborating with other Institutes. Integrate substrate development**

## 6.4 System Development

**FHE:** Support fully flexible electronic package Spiral Acquisition programs



**EX: Flexible Digital X-ray**

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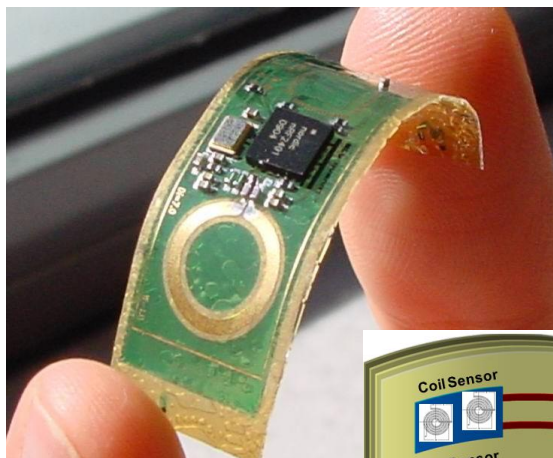




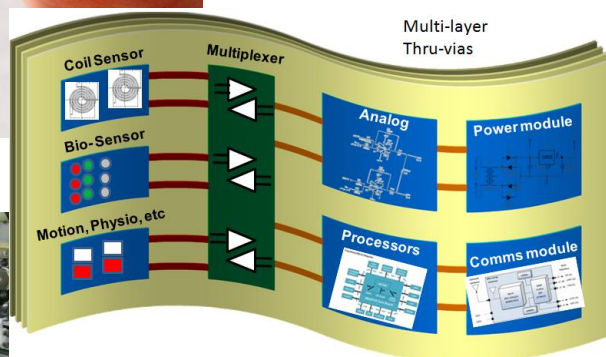
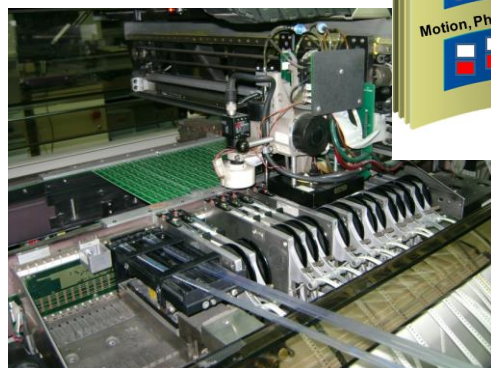
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Example images



Proposals Due  
June 19, 2015

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**FLEXIBLE HYBRID ELECTRONICS  
MANUFACTURING INNOVATION INSTITUTE**





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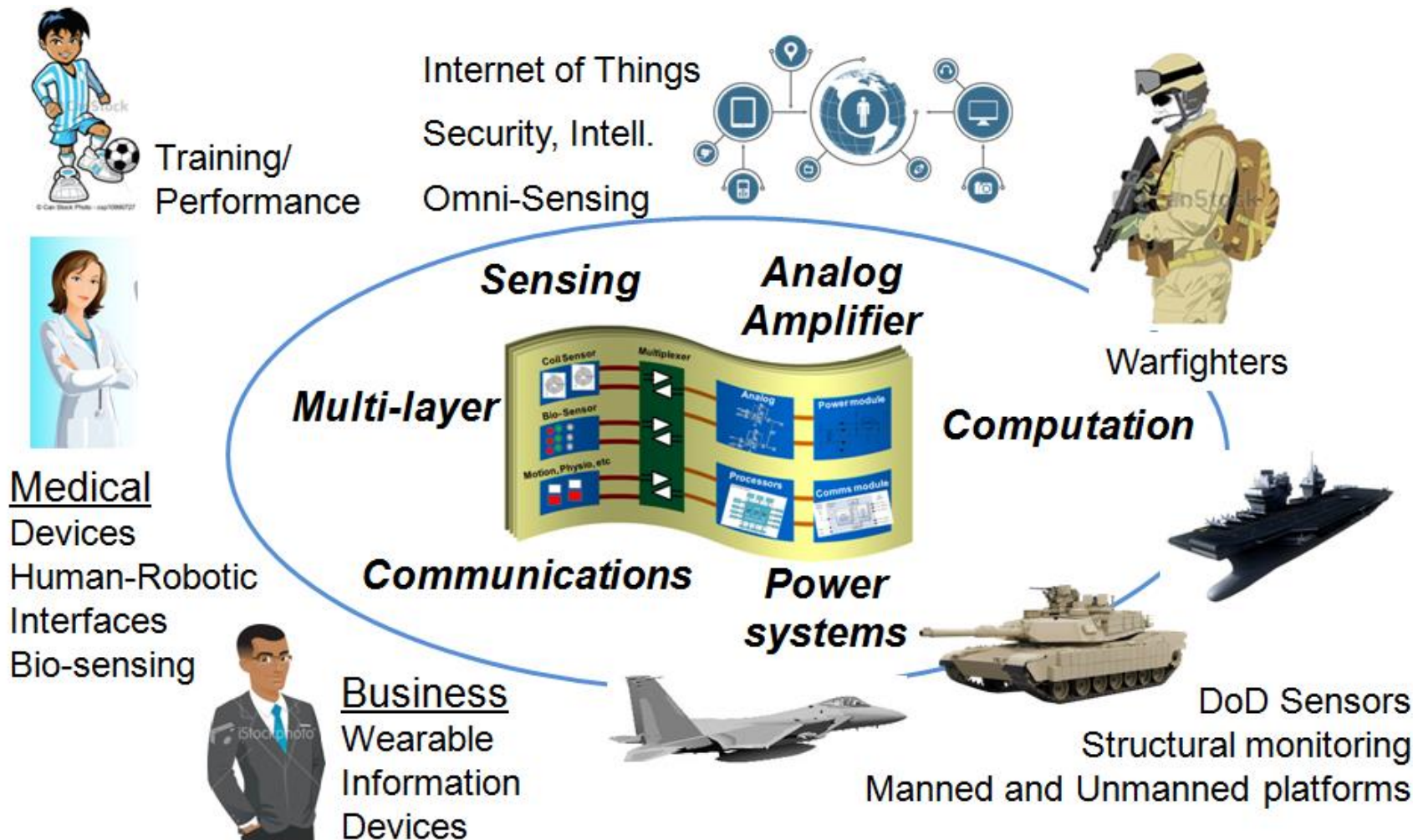
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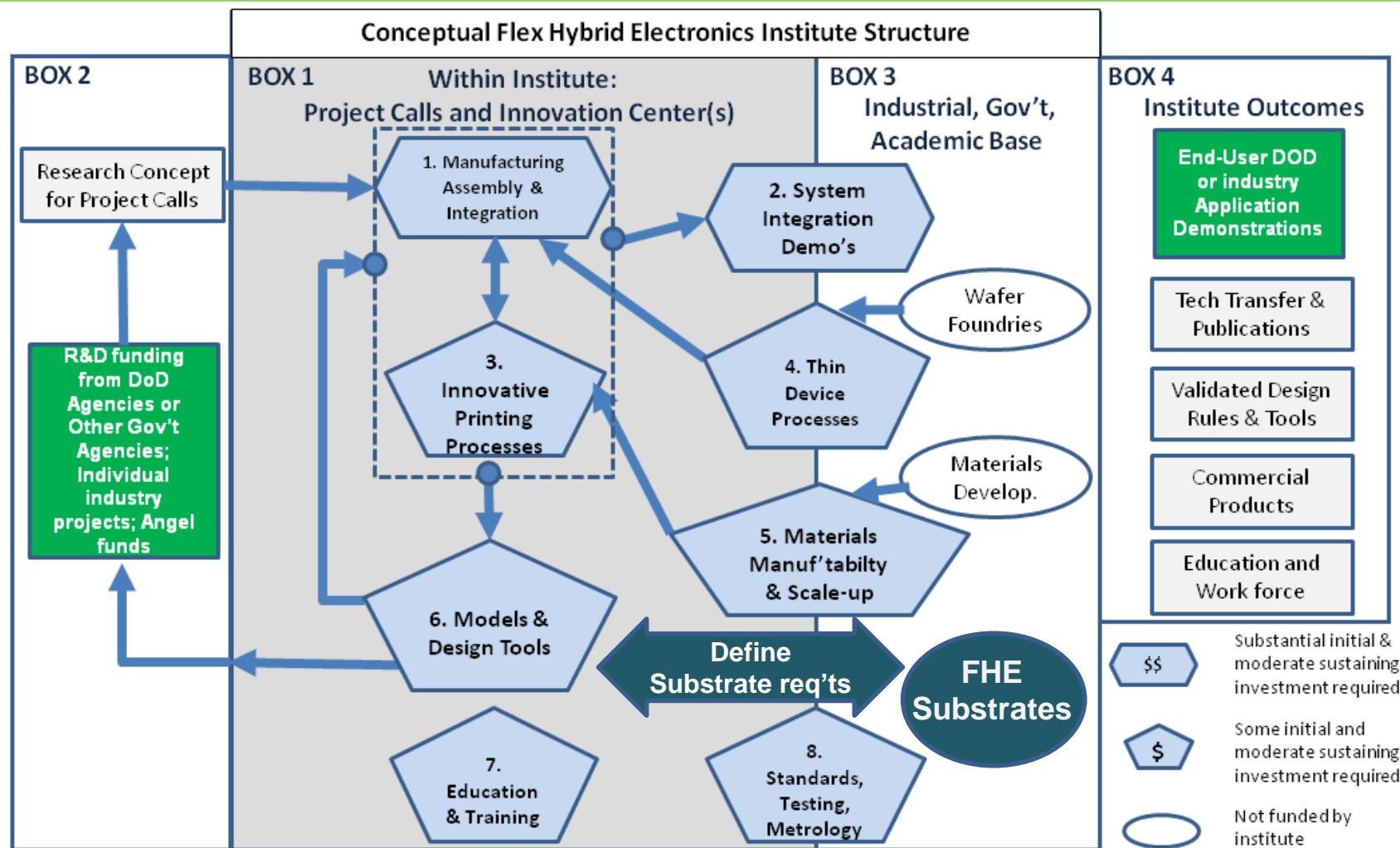
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**FLEXIBLE HYBRID ELECTRONICS  
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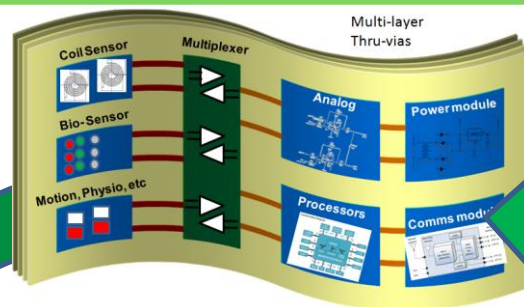
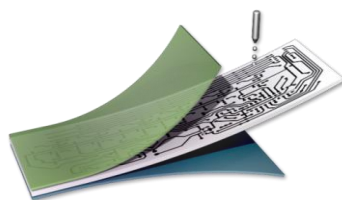


**FLEXIBLE HYBRID ELECTRONICS  
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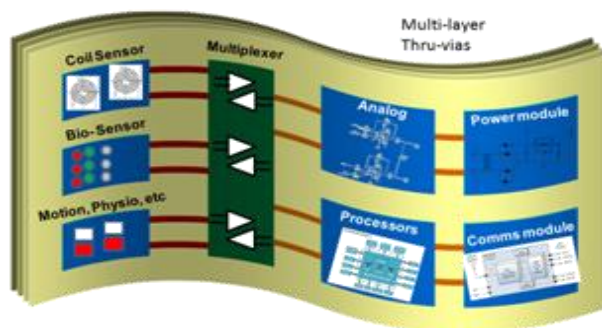
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**FLEXIBLE HYBRID ELECTRONICS  
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# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

## PROPOSERS' DAY

**Institute for Advanced  
Composites Manufacturing  
Innovation**

**Ms. Kelly Visconti – Department of Energy  
Advanced Manufacturing Office**



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# Advanced Manufacturing Office (AMO): Focus

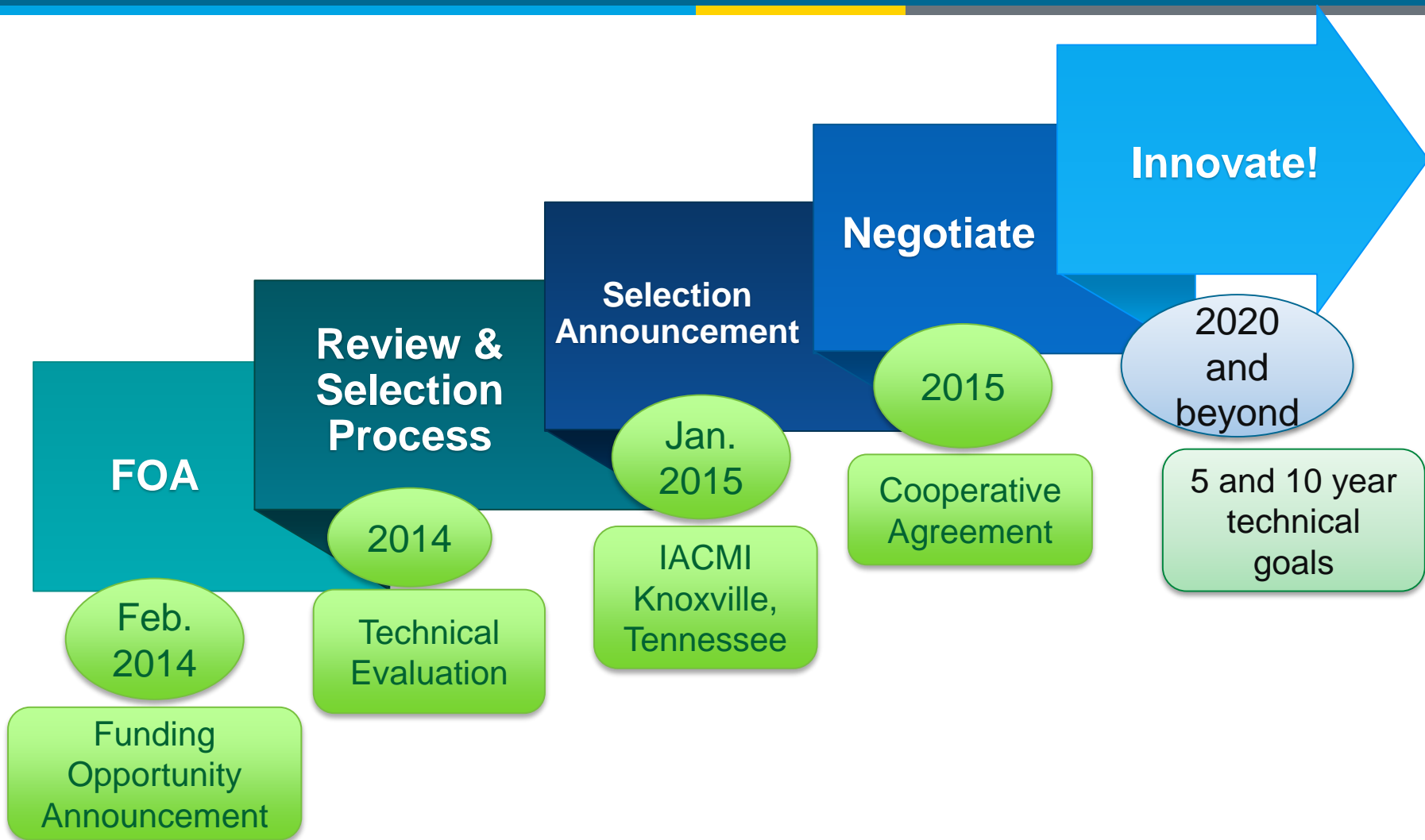


**AMO's Focus is to Increase U.S. Manufacturing Competitiveness through:**

- **Industrial Efficiency for Specific Energy Intensive Industries**
  - *examples: Aluminum, Chemicals, Metal Casting, Steel*
- **Manufacturing Innovations for Advanced Energy Technologies**
  - *examples: carbon fiber composites, advanced structural metals/ joining, wide bandgap semiconductors/ power electronics*
- **Broadly Applicable Industrial Efficiency Technologies and Practices**
  - *examples: industrial motors, combined heat and power (CHP), efficient separations, microwave processing*

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# Launching the Institute for Advanced Composites Manufacturing Innovation (IACMI)



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# FOA Objectives

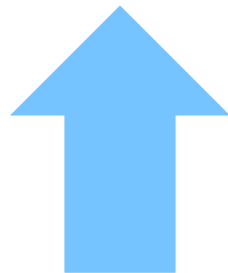
*Develop and demonstrate innovative technologies  
that will within 10 years...*

**...make FRPs for clean energy products**

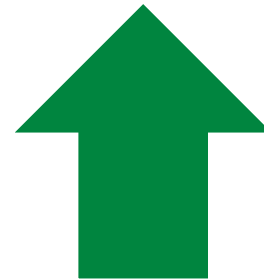


**50% Lower  
Cost  
Using 75% Less  
Energy**

**And Reuse or  
Recycle >95%**

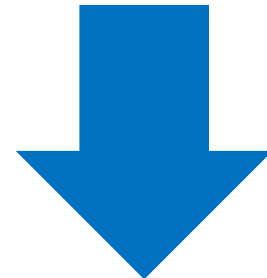


**...and support U.S. Manufacturing  
Competitiveness**



**Energy Productivity  
Regional Economic  
Development and Jobs  
Domestic Production**

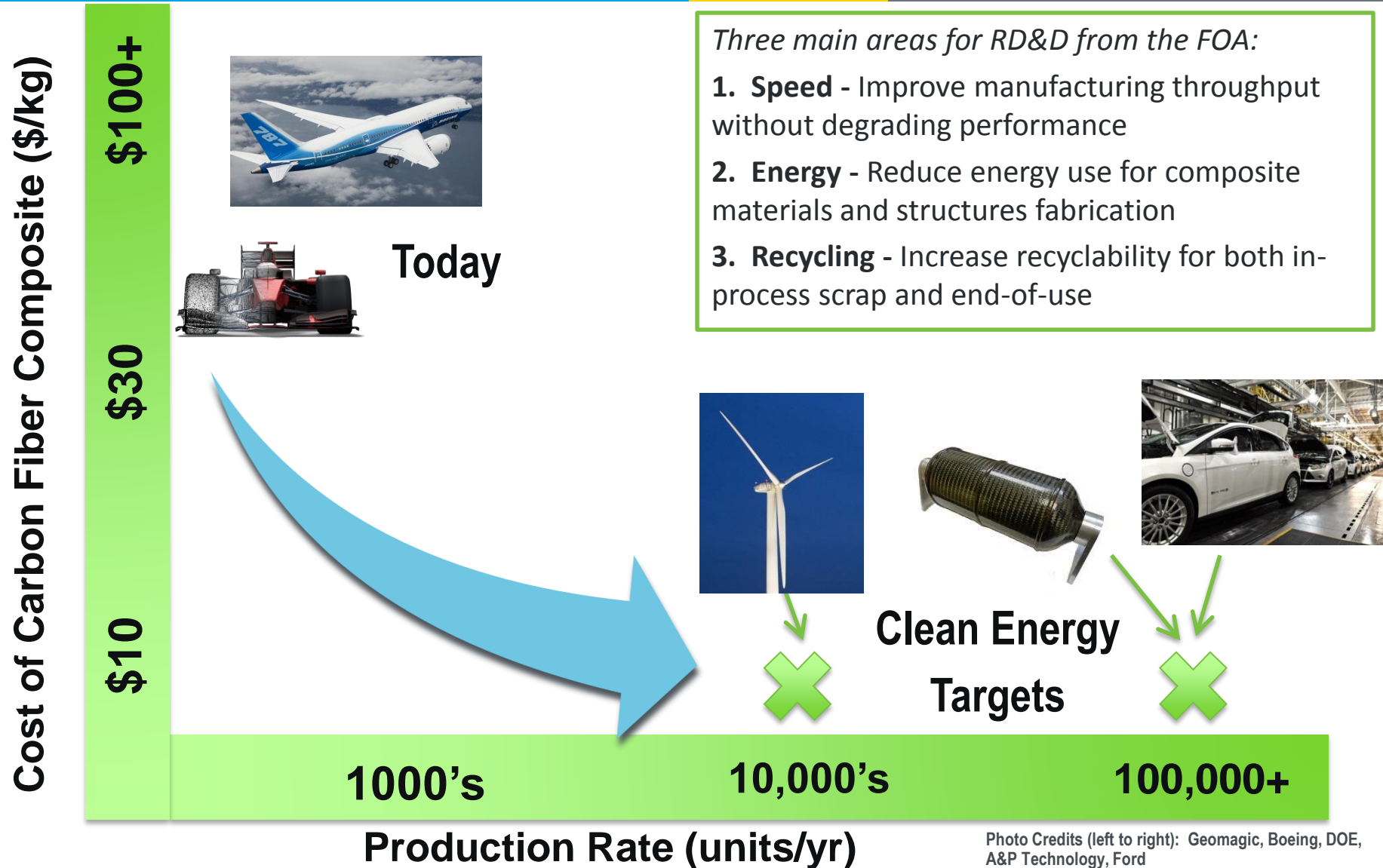
**Reduce  
Energy Use**



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# Advanced Composites for Clean Energy Drivers



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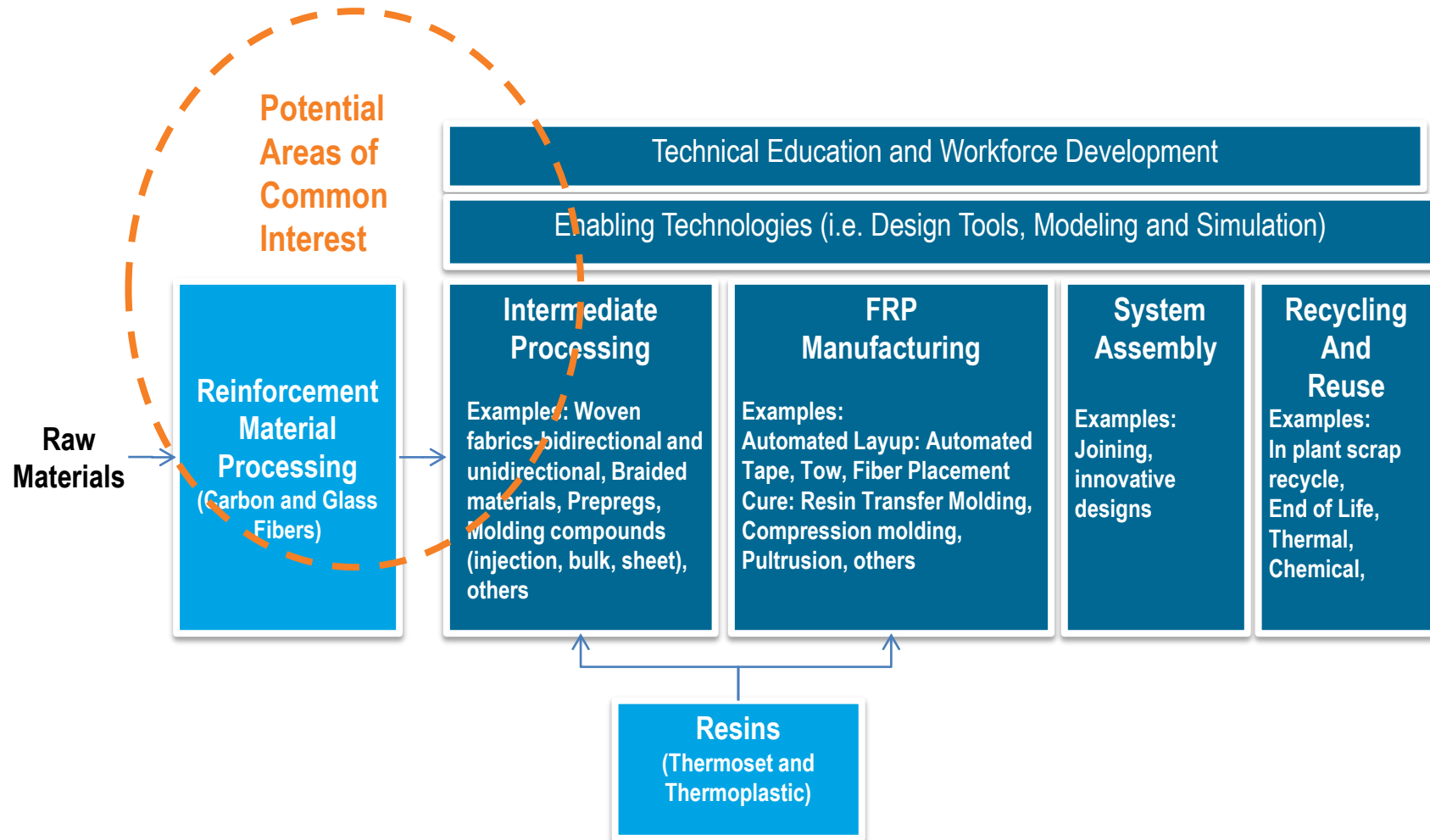
# Cost Targets for Carbon Fiber Composites (CFC)

Application	Estimated Current CFC Cost	Institute CFC Cost Reduction Target (2018) <sup>88</sup>	CFC Ultimate Cost Target (2024)	CFC Tensile Strength	CFC Stiffness	Production Volume Cycle Time
Vehicles (Body Structures)	\$26-33/kg	>35%	<\$11/kg by 2025 <sup>89</sup> ~60%	0.85GPa (123ksi)	96GPa <sup>91</sup> (14Msi)	100,000 units/yr <3min cycle time (carbon) <5min cycle time (glass) <sup>89,90</sup>
Wind (Blades)	\$26/kg	>25% <sup>93</sup>	\$17/kg ~35%	1.903 GPa (276ksi)	134GPa (19.4Msi) <sup>94</sup>	10,000 units/yr (at >60m length blades) <sup>90</sup>
Compressed Gas Storage (700 bar – Type IV)	\$20-25/kg	>30% <sup>90</sup>	\$10-15/kg ~50% <sup>95</sup>	2.55 Gpa (370ksi)	135 Gpa (20Msi) <sup>96</sup>	500,000 units/yr (carbon fiber) <sup>95</sup>

**Table 2.** Institute cost targets for carbon fiber composites (CFC) for key application areas at relevant production targets and representative strength and stiffness values for 0-degree unidirectional laminates.

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# Institute Focus by Supply Chain



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# DOE Institute Focus & Areas of Common Interest

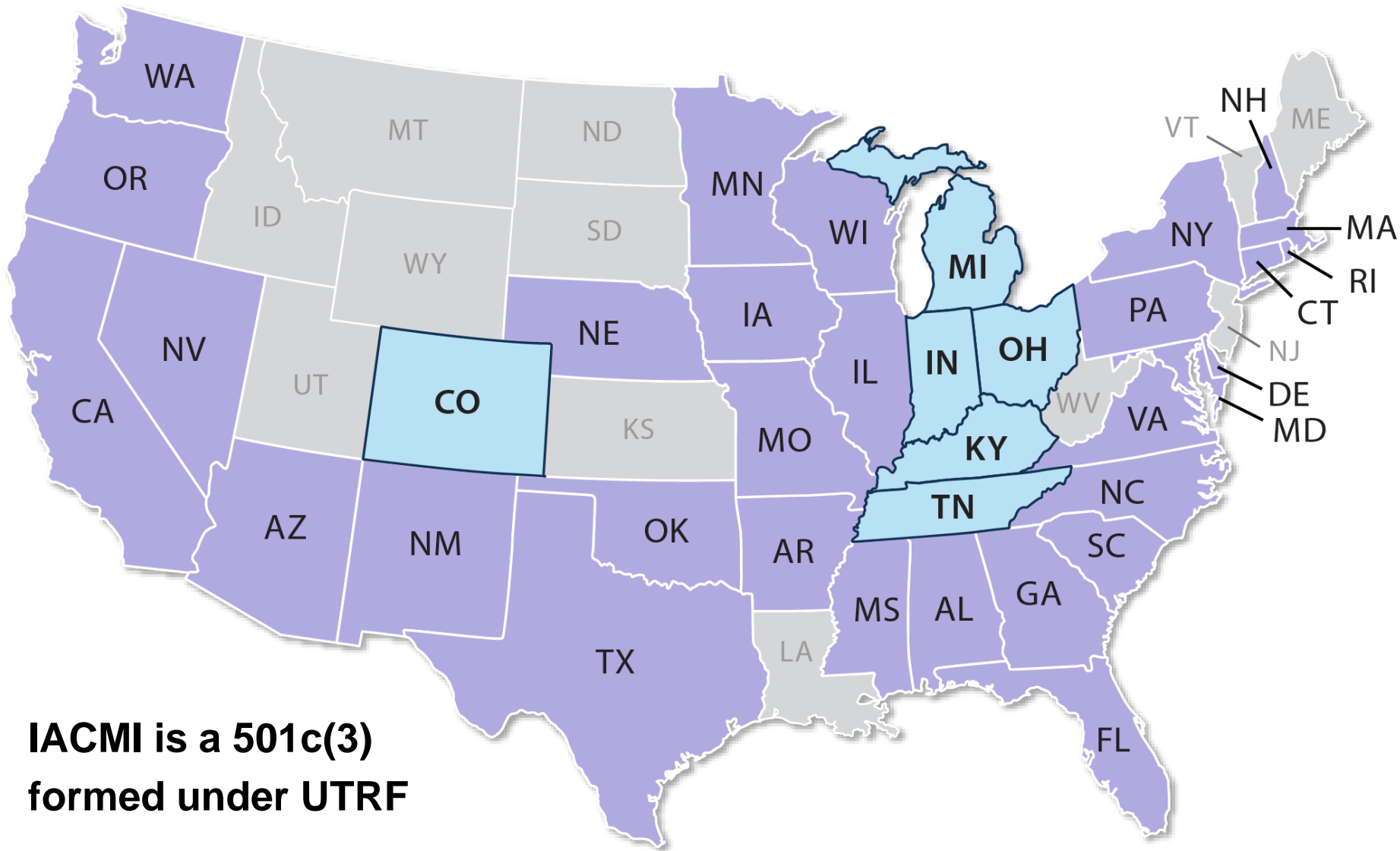
## DOE Insitute Focus

- Clean energy applications – Auto, Wind, CGS initial targets
  - High volume, lower cost, variable performance
- Composite Manufacturing Techniques – (HP-RTM, Compression Molding, etc.)
- Fiber and resin material production technology improvements to drive reduction in cost and energy (i.e. carbon fiber production energy reduction)
- Recycling/reuse of composite materials
- Initial focus glass and carbon fiber composites, open to new types of fiber
- Open to other areas provided they support DOE energy goals

## Areas of Common Interest

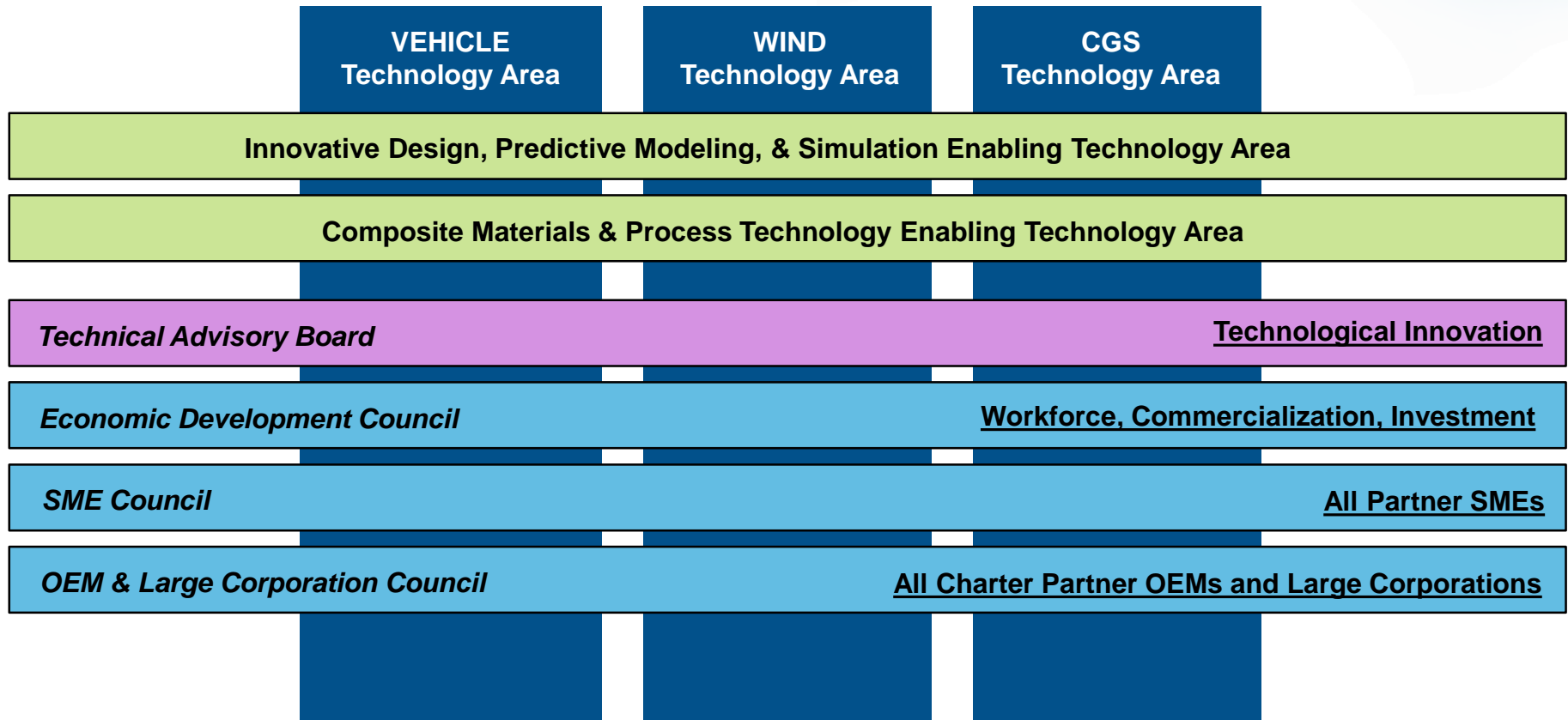
- Modeling and Simulation, Data
- New fibers – bio or others that have lower energy or cost that are suitable for composite products in clean energy
- Preforms – weaving, braiding
- Conductive fibers – electrical or thermal applications (multifunctionality)

# The Institute for Advance Composites Manufacturing Innovation (IACMI) is a National Institute



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# IACMI Focus Areas and Integration



AS PROPOSED



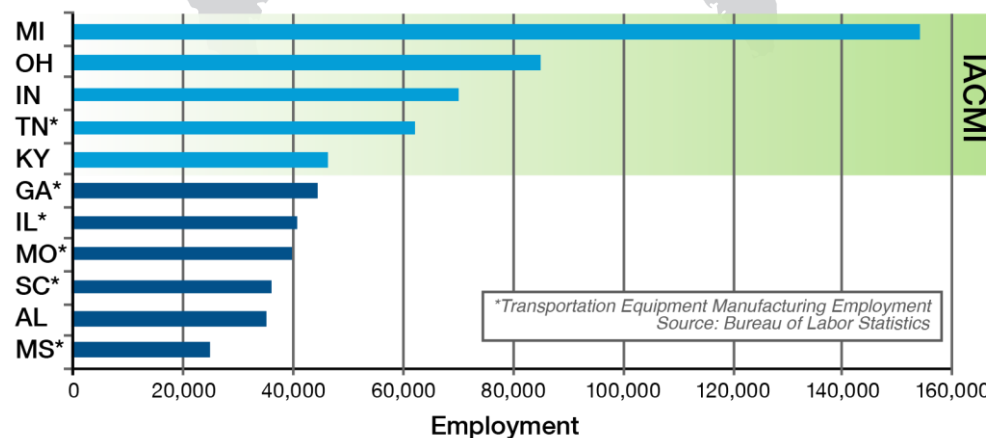
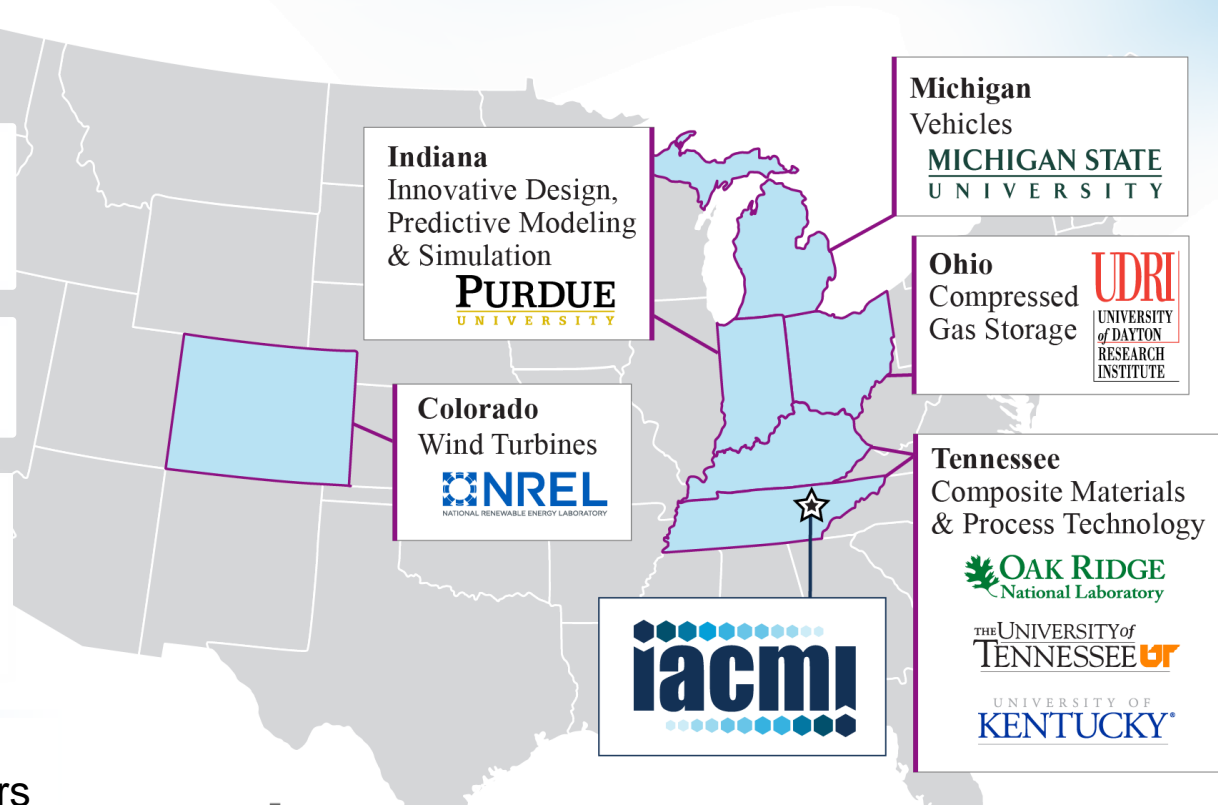
# Core partners are capable and strategically located

>70% of automotive production occurs in IACMI states

>70% of US auto R&D in Michigan alone

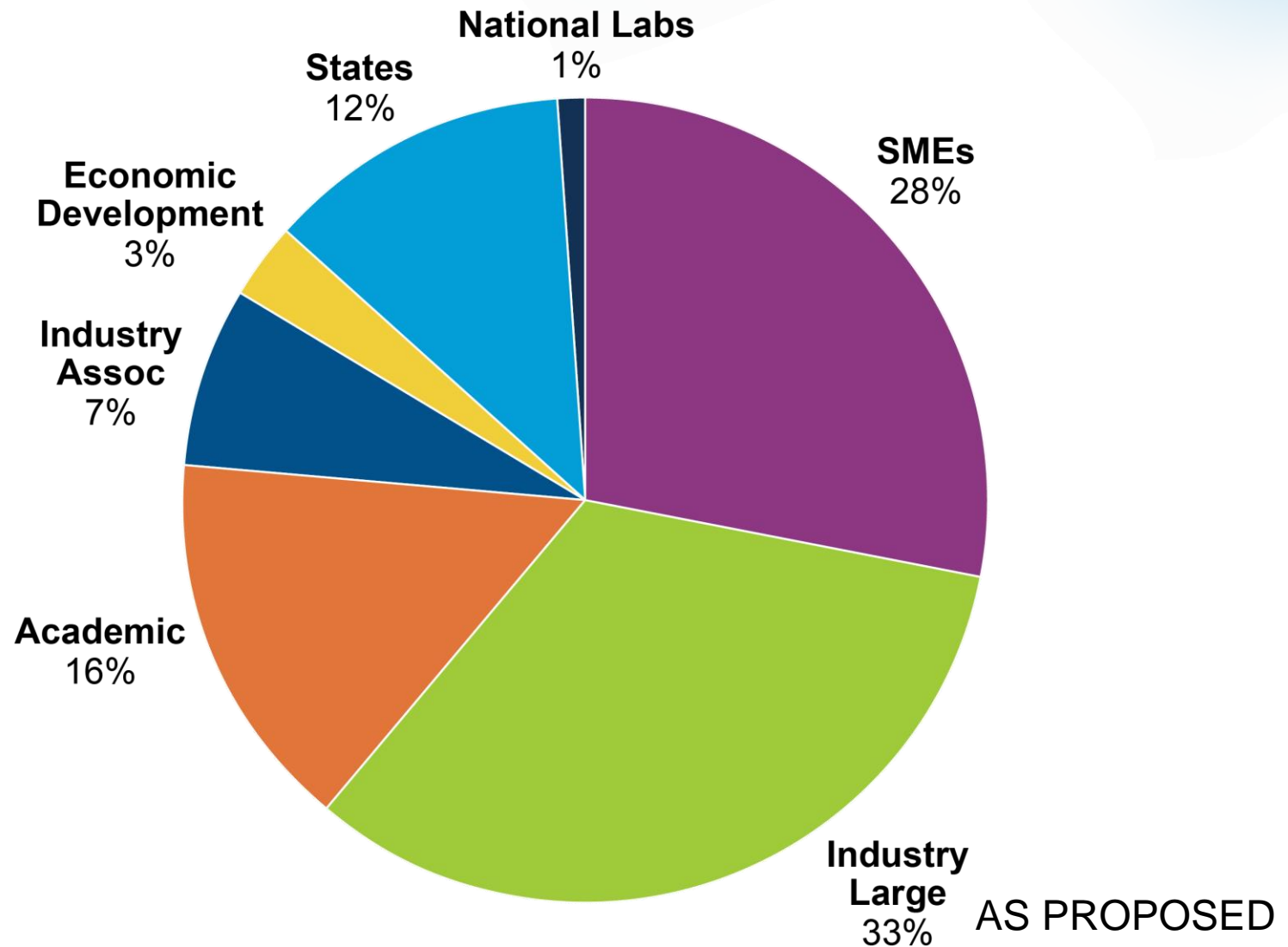
Colorado has more blade facilities (factories plus technical centers) than any other state

>60% of compressed gas fueled vehicle manufacturers with in half-day drive from IACMI Focus Areas

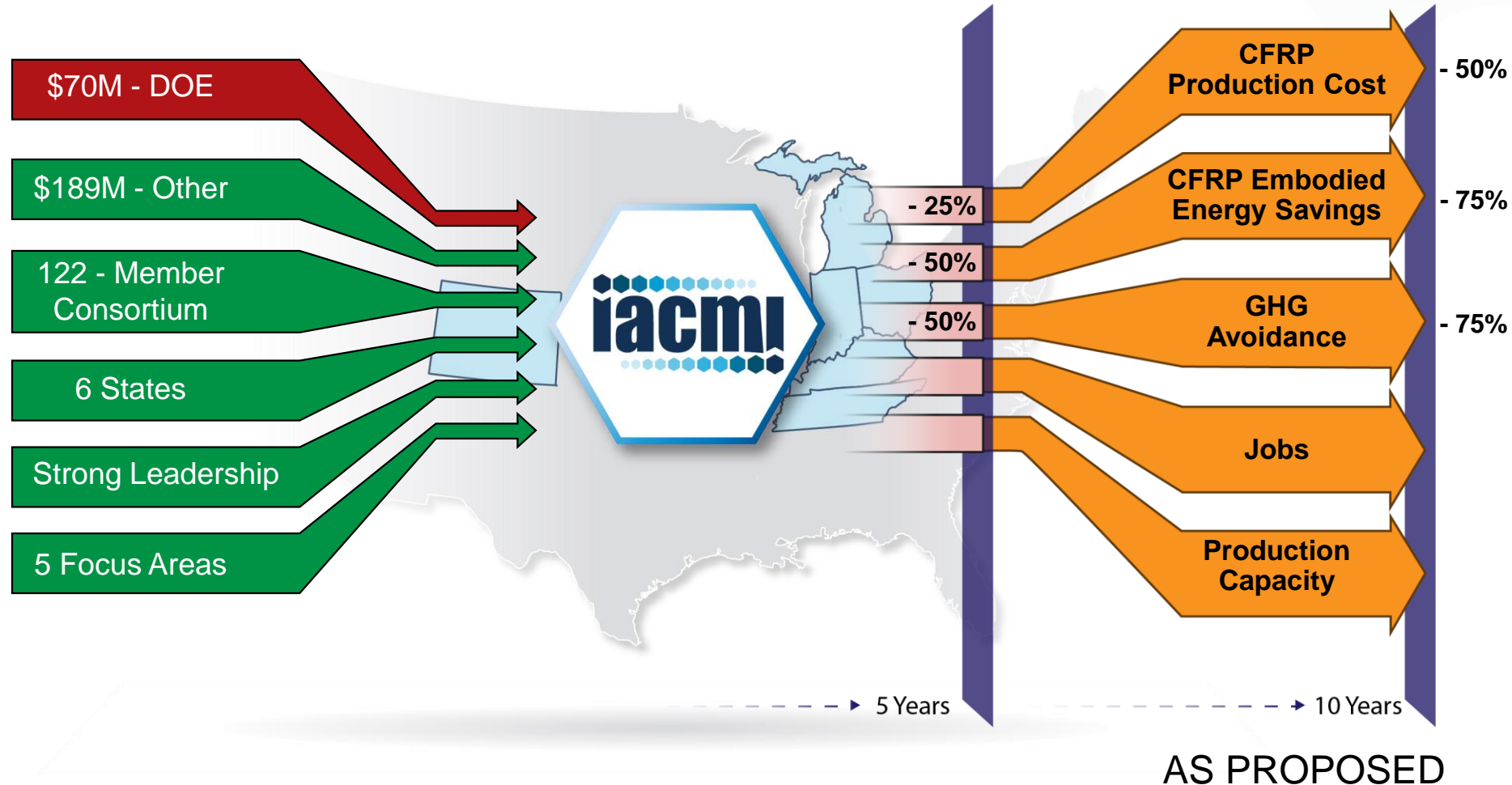


AS PROPOSED

# IACMI has >190 supporters and growing



# Federal investment will catalyze a composites ecosystem in the heart of US manufacturing





# Concluding Remarks

- **The Advanced Manufacturing Office (AMO) uses a partnership approach with industry, academia, national labs, and government to develop cross-cutting technologies**
- **IACMI is planned to be a key element of DOE's investment in composites technology development for clean energy applications**
  - Visit [IACMI.org](https://www.iacmi.org) to sign up for updates.
- **DOE is open to cross-Institute coordination and collaboration if both Institute leadership teams agree and appropriate mechanisms are identified**

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# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

**PROPOSERS' DAY**

**National Science  
Foundation**

**Dr. Mary Toney**



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# Education and Workforce Training

## Revolutionary Fibers and Textiles Manufacturing Innovation Institute Funding Opportunity Announcement Proposers' Day

May 20, 2015  
Mary Toney





# Presentation Outline

- What NSF does
- What NSF can do
- An Education and Workforce Training vision for the RFT MII



# What NSF Does

- ◉ Supports basic research and education across science and engineering (except medicine)
- ◉ Sesame Street to LIGO (The Laser Interferometer Gravitational Wave Observatory). LIGO can detect a displacement of  $10^{-18}$  meters ( $10^{-3}$  proton diameters) over a baseline of 4 km, sufficient to detect the merger of two 10-solar mass black holes within 26 million light years.
- ◉ \$7.3 Billion in FY 2015
- ◉ ~4% of Federal R&D, ~44% of non-medical R&D at US Universities, ~11,000 active projects
- ◉ ~45,000 proposals/year reviewed by ~250,000 experts/year



# NSF in Manufacturing

- ◉ Solid Modeling
  - Geometric kernel that underlies most, if not all, commercial 3D CAD Systems
- ◉ Scheduling
  - Scheduling/routing logistics algorithms used by airline, delivery, and manufacturing companies
- ◉ 3D Printing
  - 2 of the 4 foundational patents in additive manufacturing resulted from early NSF funding
- ◉ Google software was part of a \$4.5M NSF Digital Library grant
  - Larry Page – Graduate Assistant
  - Sergey Brin – NSF Graduate Fellow





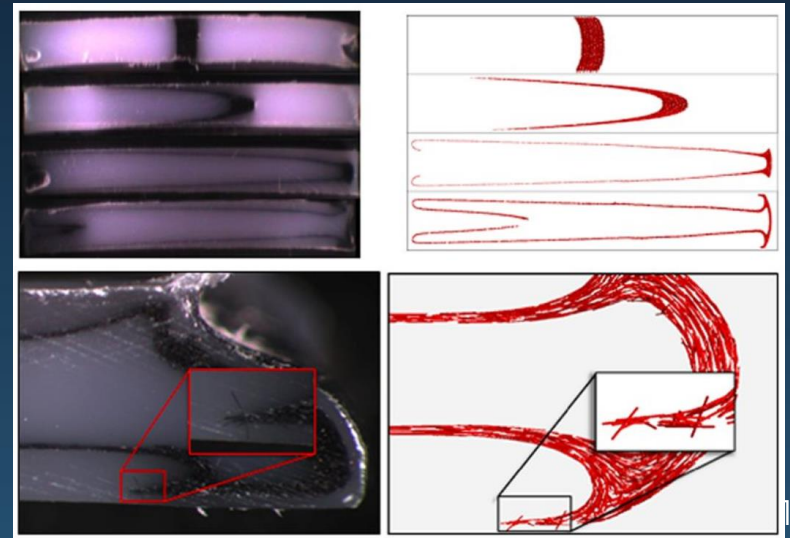
# NSF Funded Research Related to Fibers and Textiles

- ◎ Current investment \$58M
  - > Across 4 directorates
  - > Includes composites

## Modeling Fiber-Matrix Separation and Fiber Jamming During Processing of Fiber Filled Composites

*Tim Osswald, University of Wisconsin-Madison*

A mechanistic simulation tool for prediction of fiber orientation and density distribution within a molded part



Credit: Polymer Engineering Center, University of Wisconsin-Madison



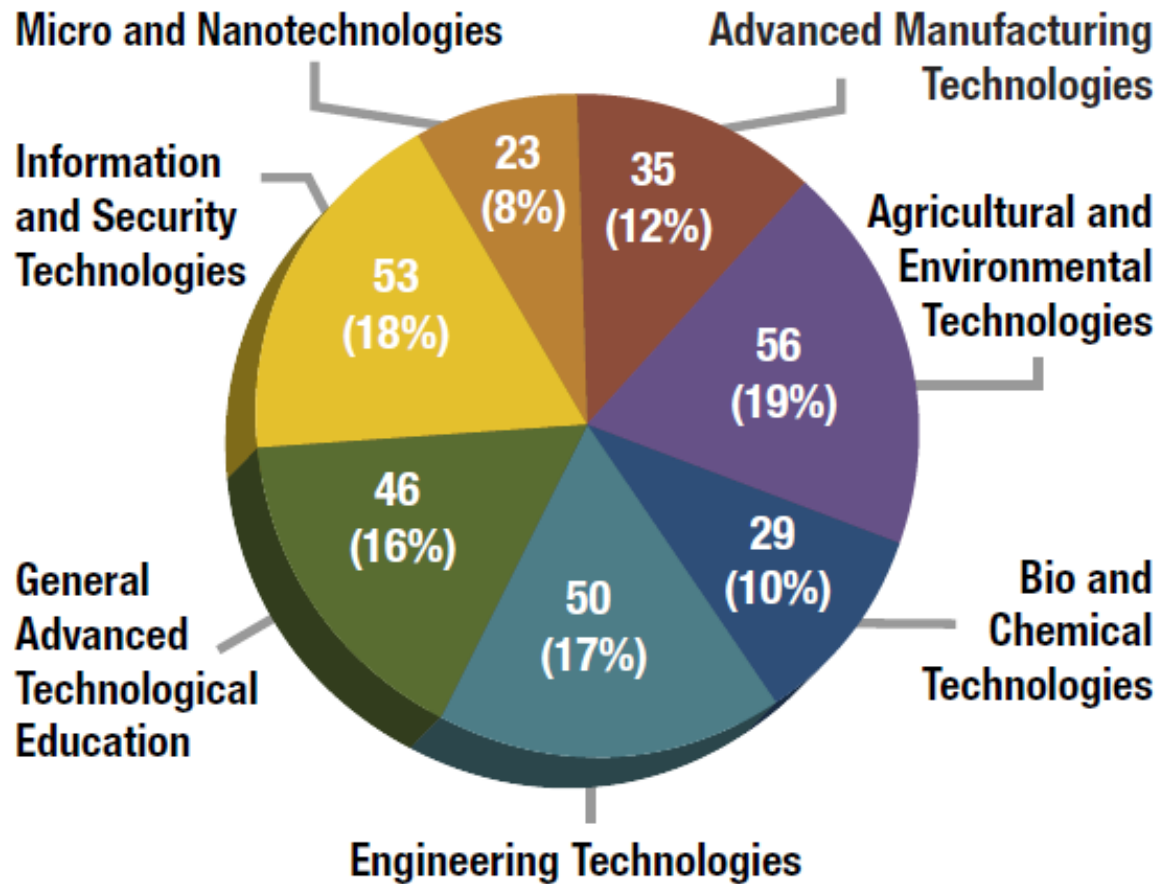
# Advanced Technological Education (ATE) Centers

- **Education** of science and engineering **technicians** for high-technology fields that drive the nation's economy. <http://www.atecenters.org/>
- **Community and Technical Colleges**
- **Partnerships: Industry, Economic Development Agencies and Secondary and 4-yr institutions**
- **Pathways: 7-12, 2- and 4-yr**



# ATE Projects and Centers

## 292 Active Grants in Spring 2013



<https://atecentral.net/ate20>

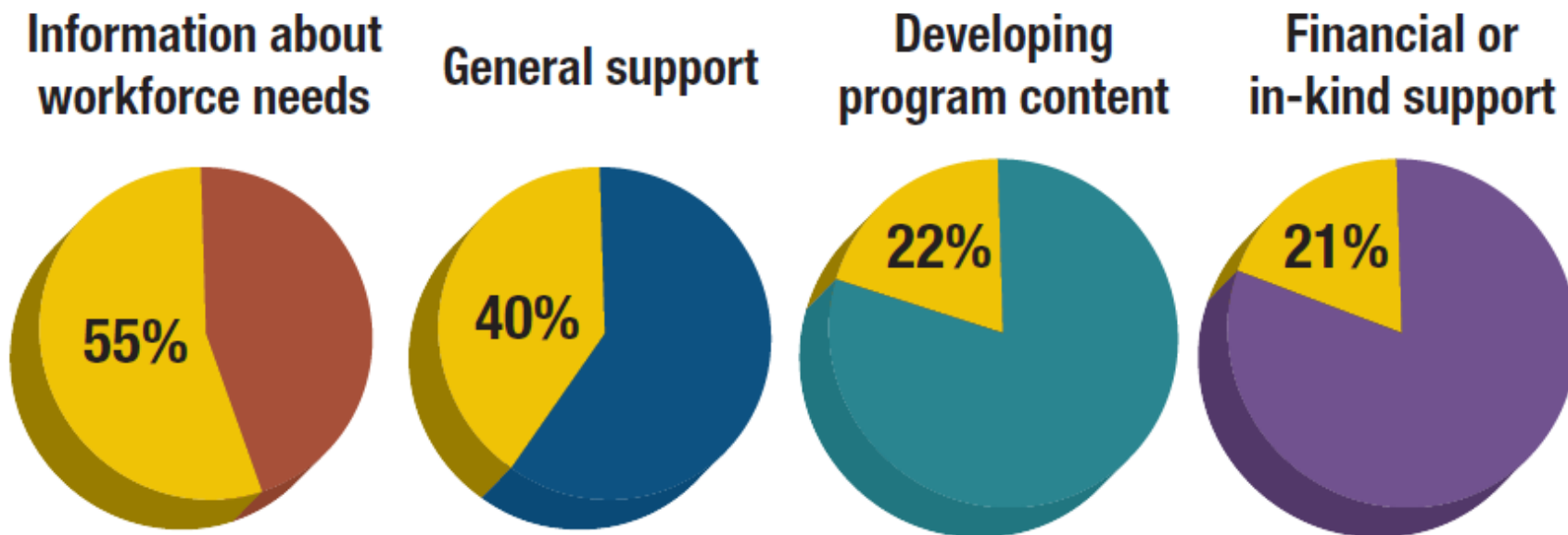
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# Academic-Industry Partnerships

## 8,000 Business & Industry Collaborations in 2012

### Reported purposes of collaboration



Percentage of respondents indicating collaboration served this purpose.

Source: EvaluATE

<https://atecentral.net/ate20>

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# ATE Advanced Manufacturing Centers

- **360°**  
Manufacturing and Applied Engineering ATE Regional Center of Excellence  
Bemidji State University  
Bemidji, MN  
[www.360mn.org](http://www.360mn.org)
- **AMTEC**  
Automotive Manufacturing Technical Education Collaborative  
Kentucky Community and Technical College System  
Versailles, KY  
[www.autoworkforce.org](http://www.autoworkforce.org)
- **CA²VES**  
Center for Aviation and Automotive Technology Education Using Virtual E-Schools  
Clemson University  
Clemson, SC  
[www.clemson.edu/ca2ves](http://www.clemson.edu/ca2ves)
- **CARCAM**  
Consortium for Alabama Regional Center for Automotive Manufacturing  
Gadsden State Community College  
Gadsden, AL  
[www.carcam.org](http://www.carcam.org)
- **FLATE**  
Florida Advanced Technological Education Center of Excellence  
Hillsborough Community College  
Tampa, FL  
[www.fl-ate.org](http://www.fl-ate.org)
- **RCNGM**  
Regional Center for Next Generation Manufacturing  
Tunxis Community College  
Farmington, CT  
[www.nextgenmfg.org](http://www.nextgenmfg.org)
- **Weld-Ed**  
Support Center for Welding Education and Training  
Lorain County Community College  
Elyria, OH  
[www.weld-ed.org](http://www.weld-ed.org)





# RFT National User Facility

- ◉ National User Facility as a “Teaching Factory”
- ◉ Faculty, Graduate, Undergraduate and Community College Students:
  - > Assist and work shoulder-to-shoulder with IMI staff and industry engineers
  - > Obtain state-of-the-art data, experience and knowledge of industry needs
  - > CC students: technical operations training
  - > UG students: internships/undergraduate research/work experience
  - > G students: thesis research, technology transition
  - > On-line data availability/access
  - > Process modeling/control competitions, etc.





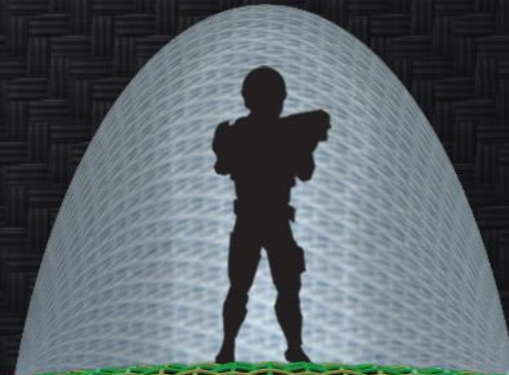
## NSF would like to:

- ◉ Receive, review and fund worthy research proposals to work with the RFT MII
- ◉ Provide supplementary funding to NSF-funded projects to work with the RFT MII
- ◉ Participate in the review of the Education and Workforce Training sections of RFT MII proposals
- ◉ Provide supplementary funding for proposed education and workforce training efforts that:
  - > present a clear strategy for E&WT and a compelling implementation plan
  - > leverage existing national resources
  - > can share infrastructure with and augment the proposed MII technology development activities

# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

PROPOSERS' DAY

Break



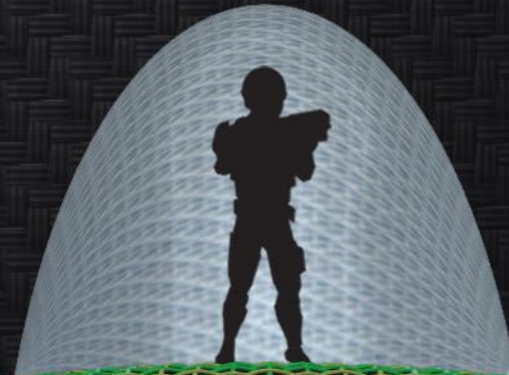
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**Additional Q&A**



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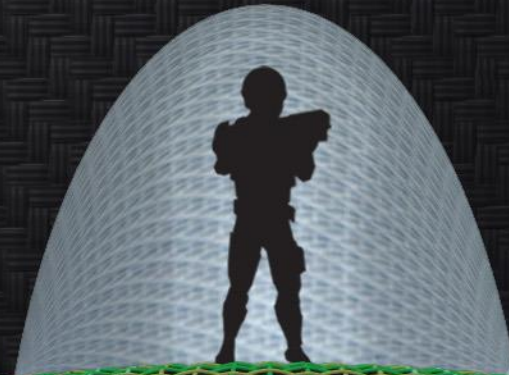


# REVOLUTIONARY FIBERS AND TEXTILES MANUFACTURING INNOVATION INSTITUTE

## PROPOSERS' DAY

### Concluding Remarks

Ms. Adele Ratcliff



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